

# DISCOVER DIVING

The Diver's Journal



November/December  
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## Fiji

**Superb Diving and Charm**

A Feature on the Northern Group

**California Kelp Beds**

**Hawaii's Molikini**

**Fish Photography**

Shooting with a Plan

**Baja's La Bufadora**

**Whidbey Island**

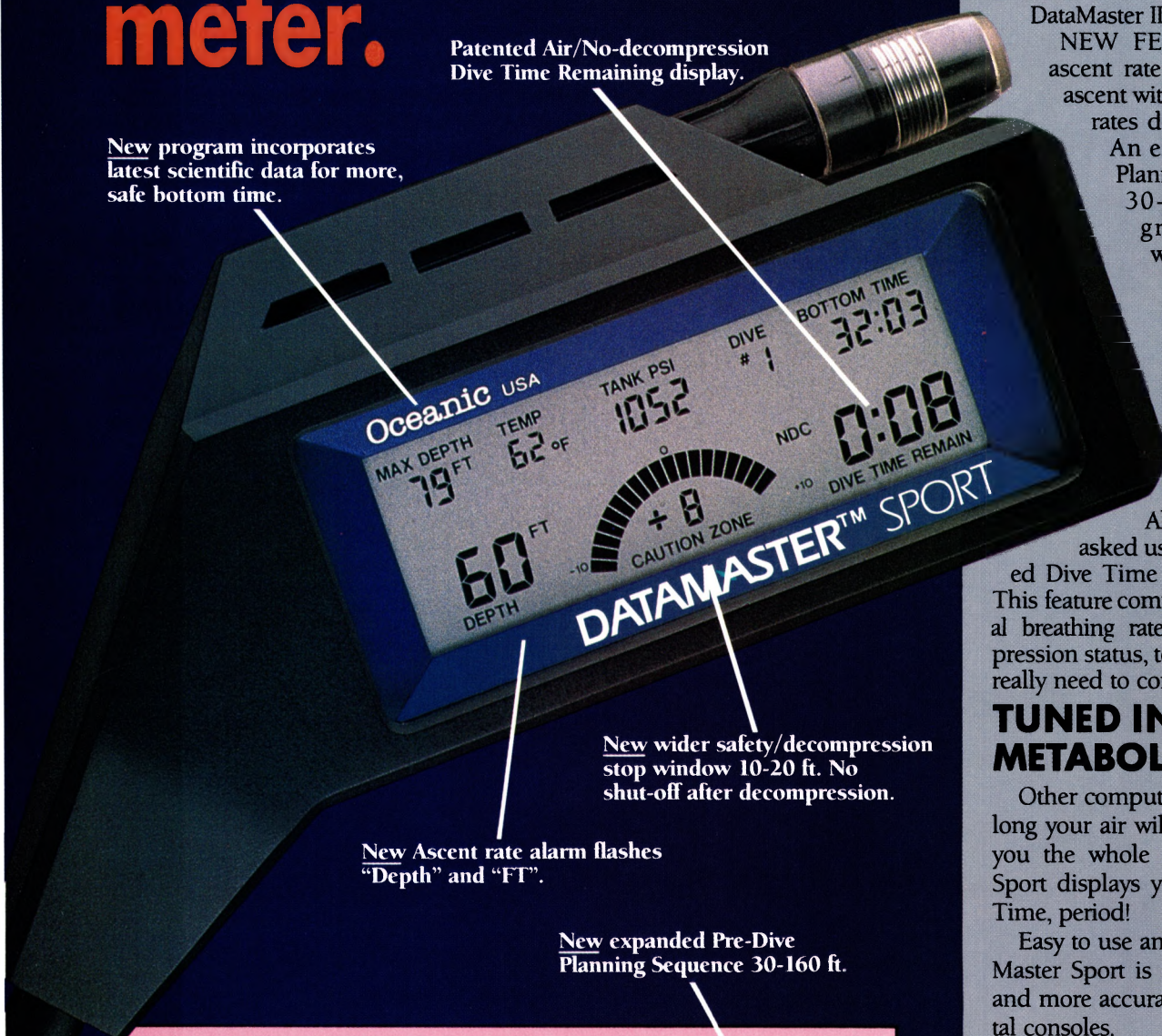




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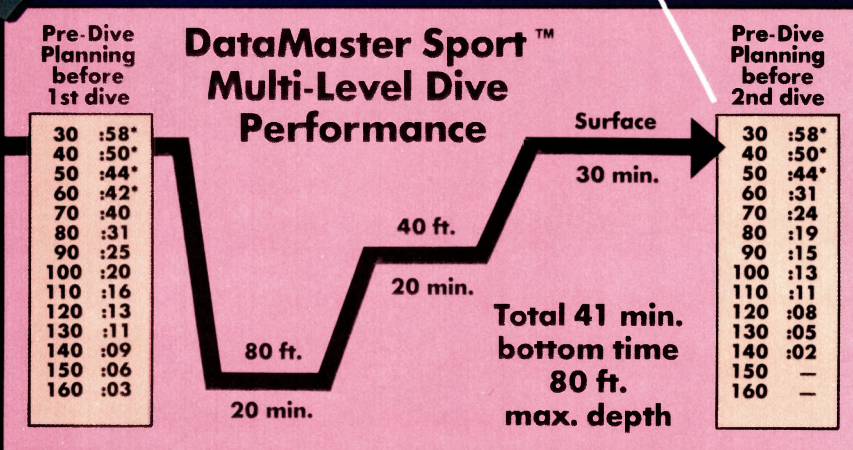
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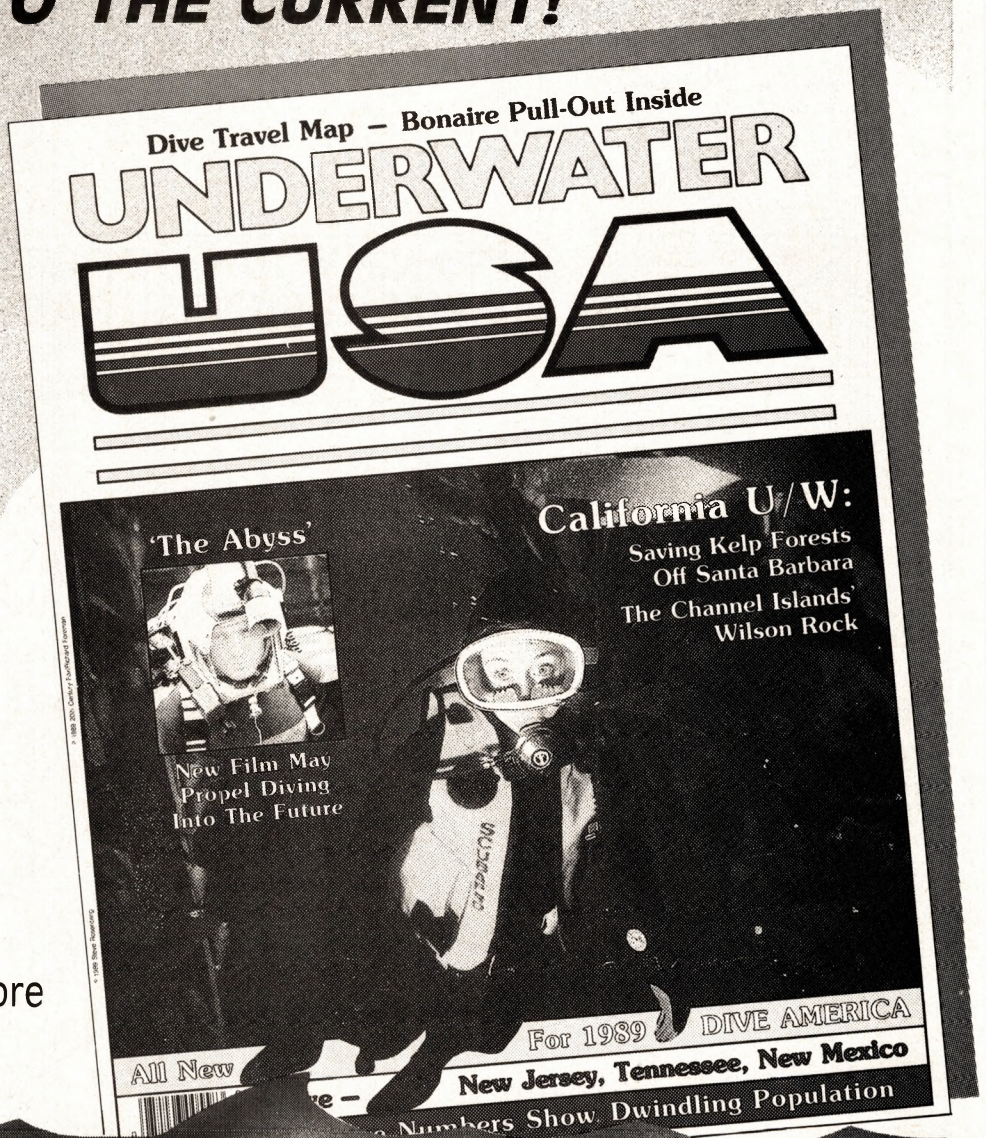
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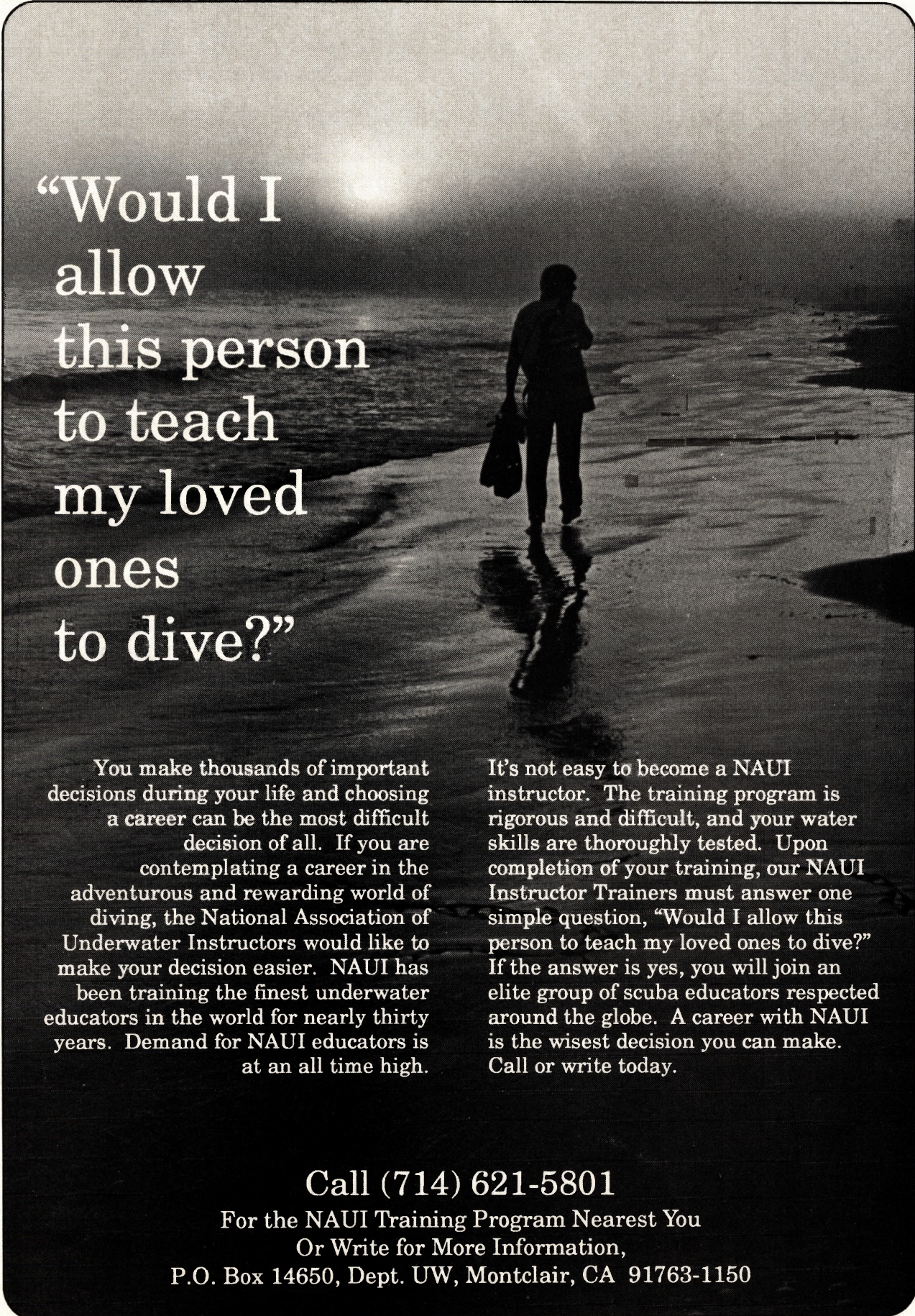
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Nov/Dec 1989

*The Diver's Journal*

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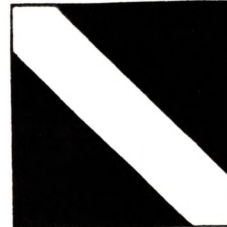
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### Cover Photo by Michael Steidley

This issue's cover features Jolee Brunton, a Discover Diving Staff, exploring a reef in Fiji. The photo was taken by Michael Steidley. Mike used a Nikonos V with a 20mm lens and Nikonos SB 102 strobe system for artificial light. The film he used was Fujichrome 100, an aperture set on f5.6, and a TTL exposure.



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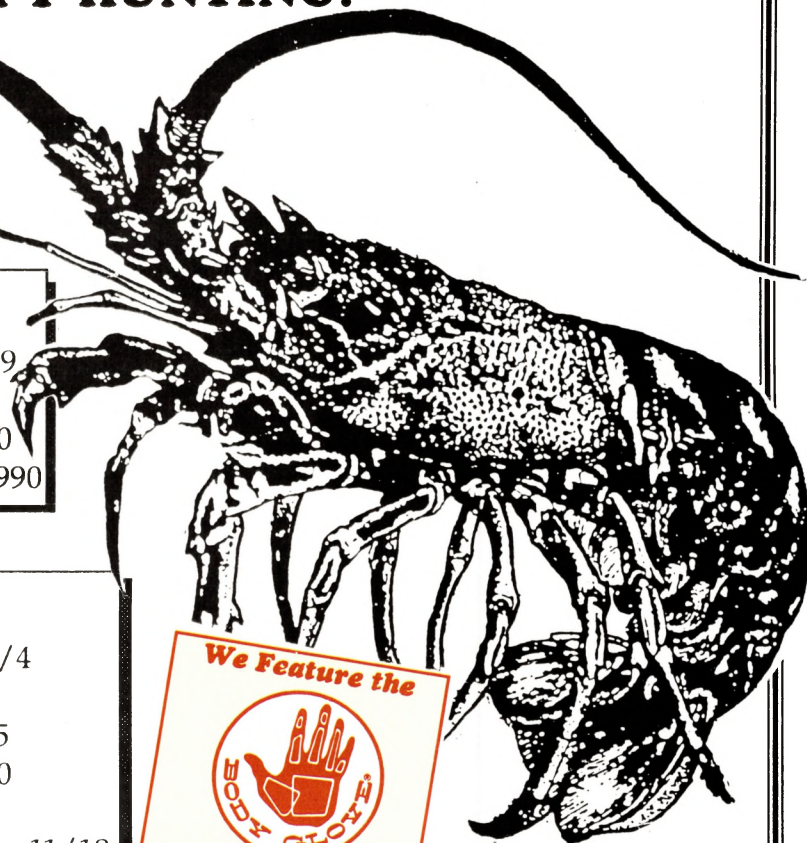


## EXOTIC TRIPS

Cozumel: Galapago Inn , Dec. 9, 1989  
Belize Aggressor: Jan. 20, 1990  
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# Maui's MOLOKINI CRATER

*Hawai'i's most popular dive destination*



*Milletseed (a.k.a. lemon) butterflyfish (*Chaetodon miliaris*) often school by the hundreds. Kathy Canham feeds them at ENENUE.*

**Text and photography by  
Rod Canham**

**T**he fourth leading dive destination in the world, Hawai'i offers an abundance of marine delights. Over 600 species of tropical fish create a color-

ful palette for an otherwise monochromatic backdrop of alluring lava formations. Daily encounters with octopus, green sea turtles, moray eels and whitetip reef sharks both

charm and excite, while "blue water" sightings of manta rays, whale sharks, and other pelagics offer what are usually once-in-a-lifetime memories on a regular basis. Tran-





A pair of ornate and colorful dragon (a.k.a. leopard) moray eels (*Muraena pardalis*) at GARBONZO'S LAIR.

siting dive boats are often escorted by bottlenose porpoise and spinner dolphins, and during the winter months the annual visitation by melodious Humpback whales is anticipated throughout the state for their curious displays and interaction.

The state's volcanic origins laid the foundations for not only the diverse and majestic islands, but the underwater topography as well. Lava ridges, pinnacles, tubes, and caverns form the substrata for coral growth, a habitat for tropical fish and unusual invertebrates, and a limitless source of exploration. All of this is in temperate waters that range from a winter low of 73°F to a summer high of 81°F.

The islands of Maui, Lana'i, Moloka'i and Kaho'olawe were initially formed as one big island. Over time, as the land mass receded, the shallow basin filled with sea water to form the four islands now known collectively as Maui County. The "Valley Isle" of Maui is dominated by the West Maui mountains and the imposing 10,023

foot Haleakala. The tuff cone of Molokini was part of a chain of vents for that now dormant volcano.

## MOLOKINI CRATER

A recent survey conducted by the University of Hawai'i's Sea Grant program, lists MOLOKINI CRATER as the most popular dive site in the state. Located in the 'Alalakeiki channel midway between Maui and Kaho'olawe, travel times to the crater range from 20 minutes out of Kihei, 45 from Ma'alaea Harbor, to over an hour with some of the larger dive boats out of Lahaina. Diving directly off-shore Maui is relatively limited, when compared to the dive offerings of Lana'i or Molokini, so "inter-island" is the key.

Protected from the winds by Haleakala, Molokini usually offers calm waters, but not always. Early morning departures to the crater are necessitated by the northeast trade winds that pick up in the afternoon, but diving the crater is worth

the effort. Molokini's unusually clear waters set the stage for a showcase of Hawai'i's unique and exciting marine life. Visibility averages 100 feet, but ranges from a low of 60 on bad days to frequently over 150.

A State Marine Life Conservation District, Molokini's resident marine populace is protected from fishing, hunting, or collecting. The critters are so familiar with the divers' presence, they either go about their daily existence, or share interaction through fish feeding, eel petting, and encounters with transiting pelagics.

## REEF'S END

Molokini's exposed land mass is crescent shaped, rising 160 feet out of the water. At the northernmost point underwater, the edge of the crater drops off to 35 feet, gradually slopes to 70, then plummets to over 300. Lava slabs, large boulders and antler coral form an arena called REEF'S END. The most immediate impression is the number of fish that live at the sight. Schooling butterfly fish in the hundreds may be found in species such as pennant, pyramid, raccoon and milletseed. The hard to find saddleback, reticulated, and oval butterfly fish are usually seen as mated pairs. "Mu" fish (a.k.a. grand-eyed porgy)



Kathy Canham has an encounter with a juvenile day octopus (*Octopus cyanea*).

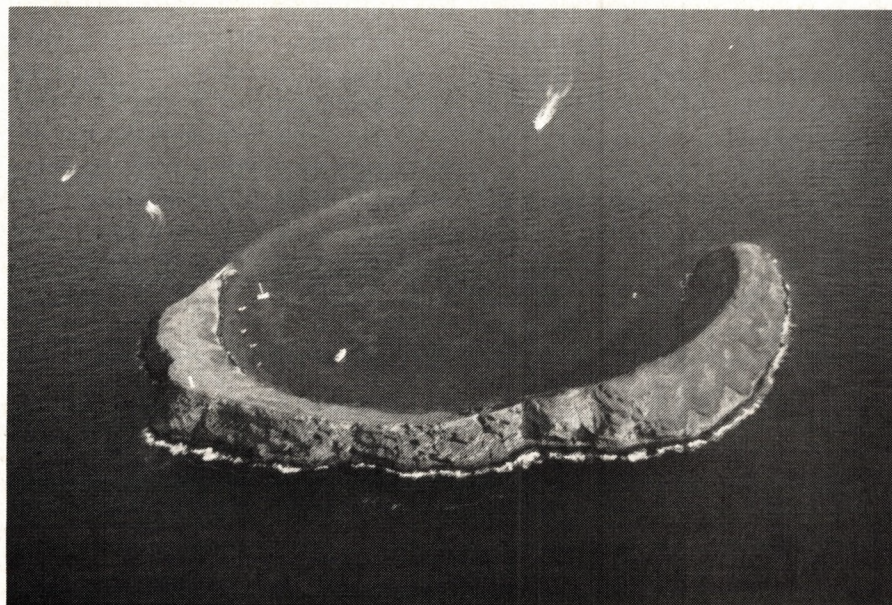


hover mid-water facing the current, while blue ulua (a type of jack) casually swim through the populace looking for food.

The lava slabs, strewn about the dive site, and stacked in a haphazard manner, serve as a focal point for schooling 'u'u (shoulderbar soldierfish), goatfish and several moray eels. The resident yellow margin and white mouth can grow to intimidating sizes, and despite their girth, some individuals are very approachable, and often provide modeling services for the photographers. Most morays are used to the guides' handling them, but others have a somewhat less amenable temperament. I strongly recommend (out of personal experience) that you do not handle the eels unless the guide gives you the lead to do so. Otherwise nips, bites and stitches can result.

The underside of some of the slabs provides a rest stop for whitetip reef sharks, that prefer having nothing to do with divers. The timid sharks do not have to keep moving in order to aerate their gills. When disturbed by gawking divers they usually circle around in a tight pattern under the ledge until they find an opening to escape, then just swim away to look for another haven. I have observed them as small as a foot long to a full adult size of around seven feet.

Spanning the area between the site and the sand channel (where most of the dive boats drop anchor), is a large rubble field. At initial glance, the rubble has no



*Maui's MOLOKINI CRATER, Hawai'i's most popular dive destination.*

visual allure, and divers usually swim directly over it, thus missing out on a wide variety of invertebrates, including rough-spined, long-spined, and pebble collector urchins. Beautiful moorish idols are attracted by overturning a rock. Oblivious to photographers, they compete with wrasse for the newly exposed food source. Octopus can often be found in the rubble as well, but discrete dive guides leave them alone at this site. Ta'ape (blue lined snapper) will aggressively attack the tips of the octopus' tentacles, damaging the shy critters.

Another area that divers often overlook is the sand channel that can yield a treasure trove of marine life. The top of the sand is seemingly littered with sea cucumbers. Spotted flounder do not give away their whereabouts until divers swim almost directly on top of them. Occasionally a flying gurnard is sighted, its pectoral fins swept back into a delta wing configuration while at rest, then opening to a completely circular foil, rimmed in purple, that allows the fish to swiftly glide away from predators with the kick of its caudal fin.

A large populace of small, thin garden eels stretch out of their holes without leaving them, and face into the current, undu-

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lating with the moving waters to nab any food that might pass by. A wavy pattern in the sand points out the track of a snake eel that, like the garden eel, will recede into the protection of its tube when threatened by approaching divers and large fish. A straight furrow points out the path of a mitre shell or a marlin spike auger.

Giant manta rays are frequently sighted swimming over the sand channel, their mouths agape to feed on plankton blooms. These gentle pelagics, when not intimidated, are often attracted to divers' bubbles, and will give either a heart-thumping close encounter, or a lesson on the joys of flying underwater.

## GARBONZO'S LAIR

Located next to Reef's End, inside the crater, is GARBONZO'S LAIR. A large lava and coral formation, ringed by rubble,

sits in 45 feet, and is the focal point of the site. Interlaced with scores of red slate pencil sea urchins, the lair is the sometimes home of a local celebrity - a very large yellow margin eel dubbed Garbonzo. We have been treated to a pair of ornate and colorful dragon eels that have taken up residence here, offering an opportunity to photograph an otherwise rarely seen species.

## TAKO FLATS

TAKO FLATS is located at the inside end of the sand channel. It derives its name from a Japanese expression for octopus, due to the frequent sightings. The area is relatively level to the inside rim of the crater, and covered with rubble. Octopus find, steal, or make their own puka (hole) to live in, then line it with a concentric pattern of coral rubble or rocks (a dead

give away in finding one of the critters). There is nothing this species of octopus can do to hurt divers, but a lot that can be done to harm them, usually through mishandling. It is best to signal a dive guide after discovering one, and have experienced hands coax the octopus out of its home, and calm it down for introductions and photos. The octopus will be very excited when it's first brought out, and will ink up a storm in an attempt to get away. But they tire easily, and will soon settle down on the diver's arm for security.

## INSIDE MOLOKINI

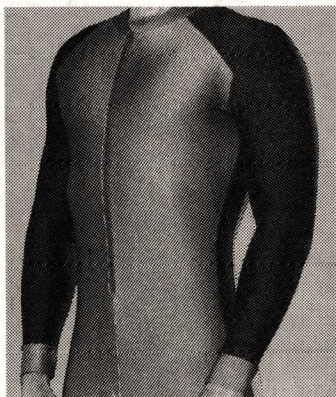
The inside rim of the crater is often densely lined with snorkeling charters, there for half-day excursions. It often gives the appearance of a large parking lot with counts up to 30 or more boats. The snorkelers are usually segregated from the dive charters, never the less, knowing what dive group you are with, and an approximate surface locale of your boat, will help avoid confusion. The snorkeling boats either anchor or use the moorings at a site called INSIDE MOLOKINI. Dense buildups of finger coral, and the chance to feed the myriad of fish in shallow waters are the areas' main attractions.

## ENENUE

The side of the crater opposite Reef's End is called ENENUE, after the gray rudder fish that meet the boats at anchor. The base of the crater's wall levels off to a very wide shelf at 50 feet, then plummets to a sand channel over 130 feet down. At 40 feet huge boulders mark the focal point of the site's favorite activity - fish feeding. A school of milletseed butterfly fish (a.k.a. lemon butterfly) insist that all newcomers feed them. If you don't have food to offer, they will either go to someone who does, or provide escort service through their territory.

Continuing seaward along the shelf leads divers to a turnaround called The Point. Surprise encounters are always a possibility here. It is at this site I had my first whale shark encounter, as well as very close sightings of manta rays. A note of

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caution: Currents often pick up, and can get deceptively strong. I recommend using discretion, and staying with the guides before venturing out too far.

## BACKSIDE MOLOKINI

One of the most requested, but rarely dived sites is BACKSIDE MOLOKINI. The aforementioned current gently carries divers along a wall that is pock marked with pukas and cauliflower coral, and is transected by deep crevices that can yield any number of different finds. It offers divers a chance to see large black coral trees in relatively shallow depths, and often inhabited by long nosed hawkfish. Up and down the wall several species of nudibranchs can be found, while schools of pennant, pyramid and milletseed butterfly fish congregate at 50 feet, and large whitetip reef sharks cruise the 60 to 70 feet depths. By looking out into blue water, there is always the possibility of sighting rays, schooling tuna, or dolphin. In 1988, customers with one of the Lahaina operations were treated to an encounter with 6 Humpback whales that cavorted with them for over thirty minutes.

The outside crater wall radically plummets to 350 feet, and does require good buoyancy control skills. The visibility at Molokini is usually so clear that depths become deceptive, and a diver not paying attention to the instruments can find himself exceeding the recommended safe diving limits imposed by the no decompression tables. Because of the current, drift dives are conducted as "live boat" dives - the boat drops the divers off, follows the

### GETTING TO MAUI

Hawai'i is an easy five hour flight from any major city on the West Coast. Visitors wishing to visit more than one island during their vacation often start on O'ahu then take an inter-island flight from there. Aloha and Hawaiian Airlines offer several flights to Maui daily. Aloha's present policy allows for no extra baggage charge, a nice plus for traveling divers.

### GETTING TO THE CRATER

There are over 20 retail and charter dive operations on Maui alone. Reservations can be made either directly with the companies, or through one of several activity desks located throughout the island's hotels and tourist centers. But, a hefty commission is charged to the companies for this service. Most dive operations are centered either out of Lahaina, Ma'alaea boat harbor, or Kihei. Boats range in size from 6 passengers to 24. The rule of thumb picking a boat is the smaller the boat, the faster the trip, but the more uncomfortable the ride in heavy seas. The larger boats are slower, but more comfortable, and usually offer lunch onboard. The personalized service offered by any of the operations is a matter of individual policy.

progress by their bubbles, then is there for pick-up when divers ascend. Transitions in and out of the water usually have to be fast, necessitating a certain degree of self reliance. Backside Molokini is also more exposed to the elements. Wind and swell can make this site undiveable, when the inside might remain relatively unaffected. Regardless, this site is very special and we always deem it a treat when we dive here.

Hawai'i often gets a bad rap from travel agents about its dive offerings. I

believe this can only come from a lack of first-hand knowledge, or a singular bad experience, and over 120,000 divers annually agree with me. Molokini Crater has been fascinating divers for years with its unusual diversity of colorful marine life, charming them with close interaction, and exciting them with thrilling pelagic encounters. Its reputation as the state's most popular dive site is certainly well deserved.

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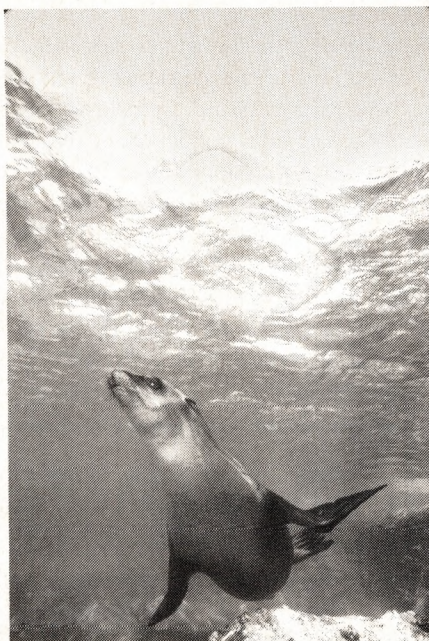




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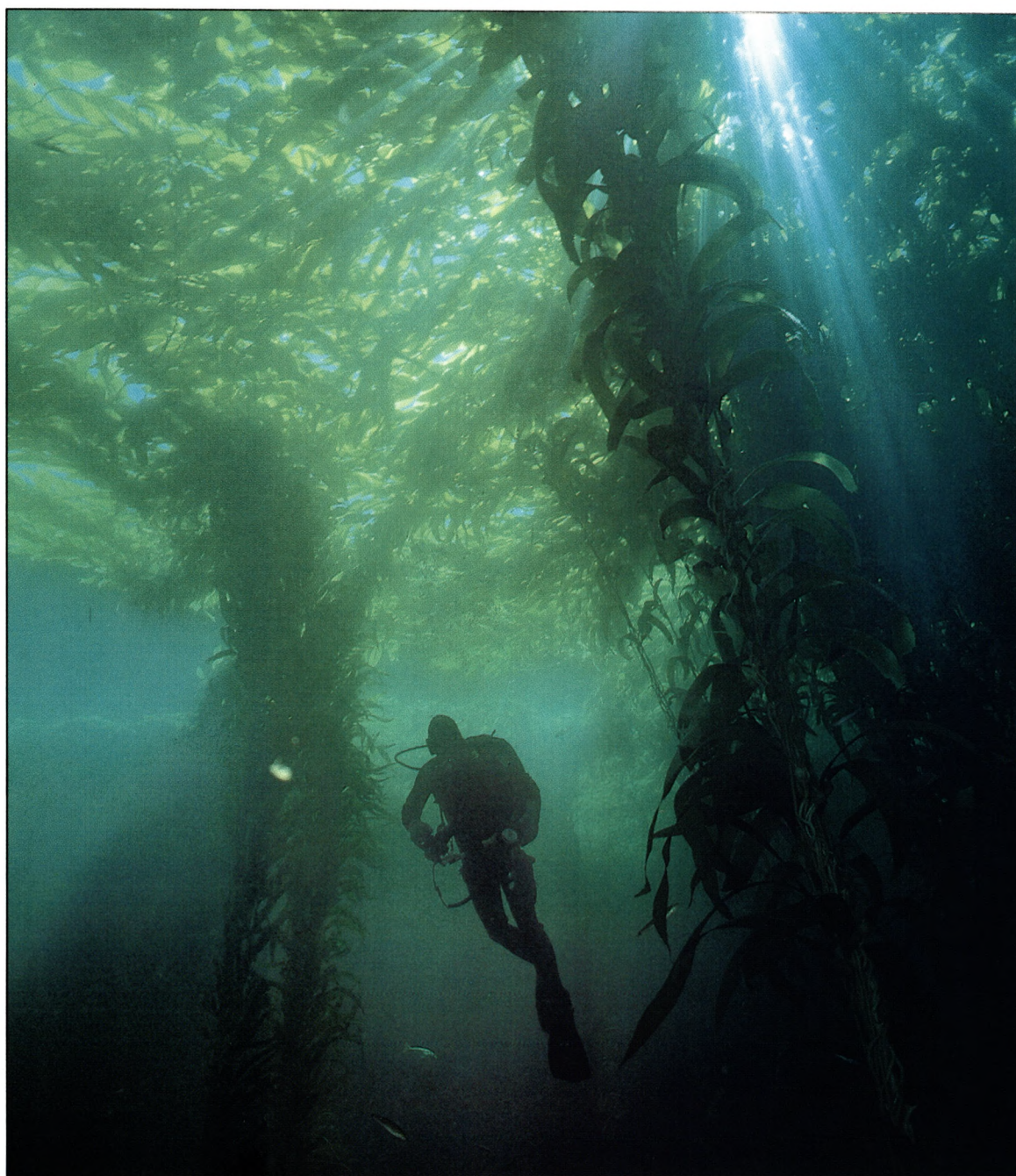
# CALIFORNIA KELP BEDS



***Forest Cathedrals Beneath the Sea Provide Unsurpassed  
Diving For Anyone with a Sense of Adventure***

Text and photography by Marty Snyderman





*(above) Few underwater sights are as breathtaking as the shimmering rays of sunlight dancing through a lush kelp forest on a perfect fall afternoon in Southern California.*

*(facing page) California sea lions frequent many kelp forests providing divers with hours of unsurpassed entertainment.*

**N**o other world-renowned diving destination is as universally misunderstood as Southern California. In those "Where is the best place in the world to dive?" conversations that occur almost every time two or more divers gather together, I have repeatedly heard divers from other parts of the world

claim that while they love diving, they would give away all their gear and take up bowling, bridge, or chess before plunging into Southern California water. According to these experts from afar, the waters of the Southern California Pacific are cold enough to threaten one's life, the visibility is so bad you can barely see your own mask,





*Many non-California divers picture kelp forests as being drab environments which lack color. In reality, few things could be farther from the truth. The Telia anemone pictured here (left) is as striking as any invertebrate in the world.*

*(right) Kelp plants are buoyed to the surface by gas-filled pneumatocysts or gas bladders. The bladders enable the plant to float off the bottom and to reach the surface where sunlight is best utilized in photosynthesis.*



conditions are harsh even on the best days, and there is nothing to see anyhow.

That assessment has puzzled me for years. I can understand how remote sites acquire undeserved reputations, but it really baffles me as to how a media center, an area that a large part of the sport diving industry calls home, can be so grossly misrepresented. But no question about it, Southern California diving is truly misunderstood, and as a result, the diving

Those of us who dive Southern California with any regularity know that no other diving destination provides more beauty and diversity than California's marine wilderness.

is vastly under-rated.

Those of us who dive Southern California with any regularity know that no other diving destination provides more beauty and diversity than California's marine wilderness. I freely admit to having

a strong sense of regional bias, but having been fortunate enough to dive in a great many places around the globe- throughout the Caribbean, in Fiji, the Philippines, the Red Sea, Micronesia, New Guinea, Costa Rica, the Great Barrier Reef, the Sea of Cortez, New Zealand, Canada, and more- my opinion is not formed without sufficient experience. I can honestly say I have yet to dive anywhere that offers better diving than Southern California. Easier diving, yes. But better, no way.

A major attraction, and perhaps the most unique feature of Southern California's underwater world, is the presence of magnificent kelp forests. During ideal diving days, few places on earth appear more inviting than a kelp forest. On the surface, the Pacific is flat calm, the water is warm, and there is hardly a cloud in the sky. Underwater, shimmering rays of sunlight dance through towering forests of giant kelp as waves pass gently overhead. The golden hues of the kelp fronds stand out against a background of blue-green water as strands of bright green eel grass flow with the surge that is passing over the rocky bottom. At a depth of 20 to 30 feet below the surface canopy divers become aware of the rhythmic sway of the entire forest. As far as one can see, the forest moves gently back and forth with the surge, the plants and animals within

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If you have never been in a kelp forest, try to imagine what it must be like to be surrounded by a dense, yet gently swaying forest of towering golden plants ...

moving in perfect synchronization with the ocean's ebb and flow.

While there are more than 20 kinds of kelp found in the waters off Southern California, it is giant kelp (*Macrocystis pyrifera*) that is the mainstay of what divers commonly call the kelp forests or beds. Ranging from Santa Cruz, California to Turtle Bay, Mexico (about halfway down the Pacific side of Baja), giant kelp is the ocean's largest and fastest growing plant. Individual plants commonly attain a length of 200 feet and during ideal growing conditions, a kelp plant is capable of increasing its length by up to 2 feet in just one day. Some kelp forests cover 10 square miles or more, but most are not that large.

But just because kelp plants grow to be 200 feet long does not mean that the kelp grows from 200 feet deep. In fact, kelp rarely grows from deeper than 120 or 130 feet. The giant kelp plants grow straight up from the rocky bottom to the surface, and the excess length of the plant spreads out on the surface forming a thick surface canopy. Healthy, dense kelp forests are found only in regions with a rocky bottom where the water temperature stays between 50° and 68° F.



*Game is plentiful in healthy kelp forests. Many divers pursue abalone, lobster, and scallops in the rocky reefs below the kelp.*

If you have never been in a kelp forest, try to imagine what it must be like to be surrounded by a dense, yet gently swaying forest of towering golden plants and a myriad of marine creatures. And yet, no matter how vivid your imagination, I'll lay odds that in just one dive you'll believe that Mother Nature's ingenuity was even better than your wildest concept of just how spectacular it can be to dive in a kelp forest.

When conditions are good, divers enjoy the opportunity to observe and photograph a diversity of marine life in a

truly stunning wilderness setting. Bright orange garibaldi, schools of silver-colored jack mackerel flashing in the sunlight, and curious sheephead often greet divers as soon as they make a splash. More than 60 species of rockfish hover over the rocky bottom, while cabezon, sculpin, colorful gobies, blennies, convictfish, and many other species of fish rest on the rocky substrate below. Migratory fishes such as yellowtail, barracuda, black seabass, and white seabass occasionally visit the kelp to feed.

Moray eels, spiny lobster, abalone,

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scallops, and a host of colorful invertebrates ranging from anemones to sea stars to richly colored chestnut cowries to brilliantly colored sea fans and purple coral await in the recesses of the reef. These, of course, are just some of the more commonly encountered residents of kelp forest communities, and you just never know when you'll be lucky enough to swim with a herd of sea lions or harbor seals, a school of bonito, or look up after filming a tiny rainbow colored nudibranch to see a 50 foot long, 50 ton California gray whale swimming overhead.

Describing kelp beds as undersea forests is obviously a valid analogy in many respects. It is not merely that the foliage alone resembles a terrestrial forest. Kelp forests provide living quarters for an estimated 800 species of marine animals in much the same way that forests on land

provide food, home, and shelter for so many creatures. Almost 200 species have been documented to live in the kelp holdfasts alone. In a typical kelp forest, there are so many organisms using the ecosystem for food, protection, and as a substrate for attachment that it is difficult for scientists to calculate the sheer numbers. One fully mature plant can support in excess of a million animals. Of course, many of these are microscopic in size. On the other hand, many species are easily large enough to observe with the naked eye. And certainly, it is this aspect, the abundance of marine life, that attracts divers

**One fully mature plant can support in excess of a million animals... many are microscopic in size...**

to the kelp beds.

It was Charles Darwin who first noted the ecological importance of kelp forests when in 1834 he proclaimed: "The number of living creatures of all orders, whose existence intimately depends on the kelp is wonderful. A great volume might be written, describing the inhabitants of one of these beds of seaweed.... I can only compare these great aquatic forests.... with terrestrial ones in the intertropical regions. Yet, if in any country a forest was destroyed, I do not believe nearly so many species of animals would perish as would here, from the destruction of kelp." The last sentence of Darwin's statement is perhaps subject to question due to the recent discovery of so many previously undocumented insect and bird species in tropical rain forests. Nevertheless, the biological importance of kelp beds is well



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"The number of living creatures of all orders, whose existence intimately depends on the kelp is wonderful. A great volume might be written, describing the inhabitants of one of these beds of seaweed...

established.

Learning a little about the natural history of kelp can make kelp forest exploration even more enjoyable. Giant kelp is a brown seaweed, a type of algae that has descended from plants that survived the ice ages. Seaweeds are not as complex as flowering plants, lacking special tissues that carry water and food from one part of the plant to another. However, in many forms, seaweeds have demonstrated a remarkable ability to survive in rather demanding circumstances. Giant kelp is a classic example. Kelp forests thrive in places where there is too much water motion and current for many plants to survive. The constant water flow provides a continuous supply of vital nutrients for the kelp plants.

With very few exceptions, kelp beds are found in areas with a rocky substrate. Mature giant kelp plants are comprised of a holdfast and a number of buoyant fronds. The frond, the part of the plant above the holdfast, is made of a stem-like stipe, a number of leaf-like appendages correctly referred to as blades, and numerous gas bladders. The blades attach to the stipe with connective tissue called pedicels.

The plants have no true root system, but instead depend on a series of short, thin, sturdy structures called haptera which look like oversized pieces of spaghetti. Collectively, the numerous haptera form a holdfast which attaches the plant to the bottom. The haptera do not penetrate the sea floor as is the case with the roots of true flowering plants. The holdfasts are, however, well designed for gripping the substrate and for resisting the constant

shock and pull of wave action, surge, and current. However, severe winter storms, the biggest natural threat to kelp forests, can rip the holdfasts loose from the bottom. Unlike land plants which take in most of their nourishment from their roots, kelp absorbs nutrients from the water through all of the plant's surfaces. The haptera are generally incapable of attaching to sand, mud, or even silt covered rocks.

Out of water kelp is quite heavy, and large entangled clumps often litter Southern California beaches, especially after severe winter storms. But in the sea, the fronds float upward as gas-filled bladders called pneumatocysts buoy the plants. The pneumatocysts (not to be confused with the stinging nematocysts found in jellyfish, fire corals, and other Coelenterates) are located between the stipe and blades. Their buoyancy allows the fronds to reach the surface where the plants receive sunlight,


an ingredient vital to the photosynthetic process by which plants convert sunlight to energy.

Unlike land plants, kelp blades have no "top" and "bottom" side. This feature enables the blades to conduct photosynthesis on both sides, the end result being the the plants can grow very rapidly even though the blades are constantly being flipped over by wave action and wind. In fact, the entire frond takes part in the photosynthetic process.


As with all species of kelp, giant kelp reproduces through a procedure known as alternation of generations in which a sexually reproducing generation alternates with an asexually reproducing generation. Thus, the complete cycle consists of two generations of plants.

For those of you who are new to diving, rest assured that kelp is not the man-eating monster of Hollywood sea lore.

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If a strand does get entangled around a fin buckle, it can be easily snapped away. Because of its elasticity, pulling the kelp can sometimes result in frustration, but bending the kelp until it breaks, in much the same way you would try to break a pencil, requires only minimal effort.

Interestingly, kelp is a highly valued economic resource. Surveys taken in the mid-1970's showed that each square mile of kelp can generate over one million dollars annually for the local economy. Commercially harvested for a natural by-product called algin, which has a high affinity for water, kelp is commonly found

in more than 70 household and industrial products. Among them are beer, toothpaste, paint, nail polishes, and hand lotions.

If you have never dived in a Southern California kelp forest, there is no better time than the present. Arranging a trip is as easy as picking up your telephone. Area dive stores and charter boats visit the kelp beds on a daily basis during much of the year, and on week-ends throughout the year. Dive stores can also provide worthwhile beach diving information, and in many areas the kelp beds are an easy swim from shore.

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### Tips on Kelp Diving

1. Streamline gear to avoid "kelp-grabbers". Fin and mask straps, dangling goodie bags, trailing gauges invite tangles. Fin straps should be taped or put through the buckle assemblies backwards (this will not work with some of the new buckle assemblies). Mask straps can be taped or cut-off short. Gauges or consoles can be slid between your BC and your body, under your arm, with the gauge or console exiting the BC at about the sternum. This keeps it in front of you for easy access, and keeps it out of the kelp.

2. Avoid surface swims. Swim between kelp stalks at a depth less than 10 feet, using your compass. Remember to save additional air for the swim back (you should have at least 500 psi, and more for longer swims).

3. Surface with both arms overhead, parting the kelp as you go through. Kelp is easy to push away.

4. Cut tangled kelp with your dive knife, or bend it in two to break it. Kelp has very good tensile strength (stretch strength) and not very good shear stress (opposite direction strength) and thus can be broken in-half easily, but not pulled apart.

5. Keep in close contact with your buddy. As in any forest it's easy to get separated and difficult to make visual contact. Also, a buddy can help untangle those annoying pieces that are hard to get to.

6. Monitor your buddy for kelp attached to fins, tank valves, etc.

7. Surf mats make shore dives through kelp much easier. Ask for them at your local dive store.



# THE SUN STAR

## Taxonomy

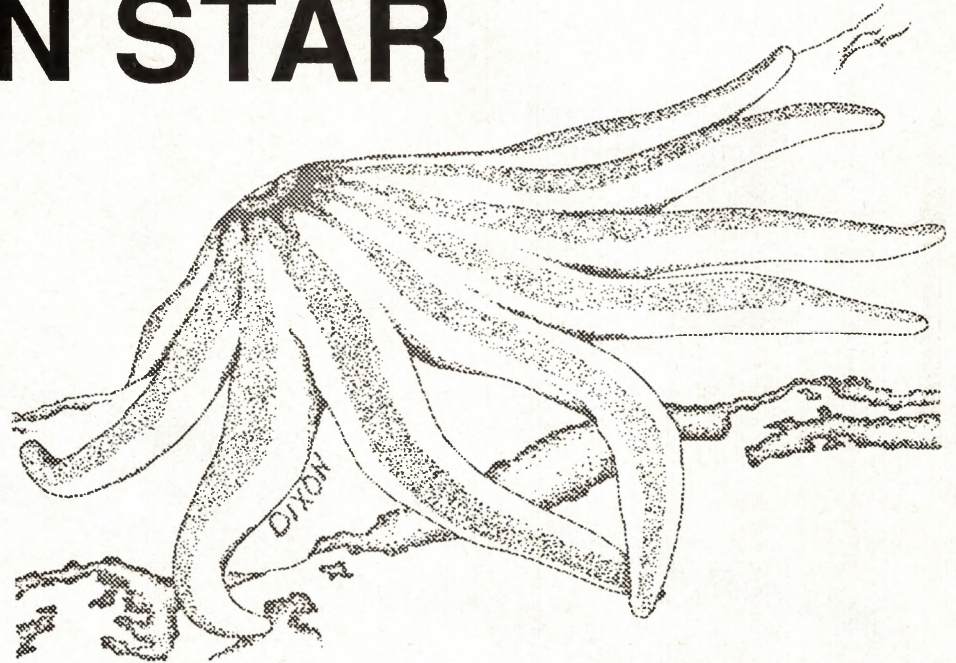
Kingdom:	Animalia
Phylum:	Echinodermata
Class:	Stelleroidea
Subclass:	Asteroidea
Order:	Spinulosida
Family:	Solasteridae
Genus:	Solaster
Species:	dawsoni

## Robert von Maier

Cannibalism. Not the best way to win friends and influence people (or sea beasts depending on your neighborhood). But, for a group of animals known as echinoderms, cannibalistic behavior does not make one a pariah. In fact, for one particular member of the *echinodermata* cannibalism is quintessential for survival.

The rapacious brute in question is none other than *Solaster dawsoni* - the sun star. *S. dawsoni*, as stated above, is a member of the phylum *echinodermata*; an assemblage of exclusively marine animals (with the exception of a few species that can tolerate brackish water) that reached its evolutionary pinnacle in the Paleozoic era (225-430 million years ago).

*S. dawsoni*'s cannibalistic dining habits are well documented in the literature. Indeed, many of its fellow seastars, its primary source of nutriment, elicit an immediate, determined escape response when put in contact with it. The sun star, as with many other seastars, exudes a chemical signal into the water that alerts prey to its presence and possibly its intentions. On the other hand, one particular species of seastar, the leather star *Dermasterias imbricata*, appears to be immune to the attacks of *S. dawsoni*. Perhaps it too exudes a chemical signal that says "...don't eat me" as opposed to "I'm going to eat you." Anthropomorphisms aside, the sun star feeds not only on its kin, but will also prey on sea cucumbers and several species of nudibranchs.



Seastars in general are commonly, albeit incorrectly referred to as "starfish."

The obvious star-shaped form, a manifestation of pentamerous radial symmetry (a characteristic of echinoderms), is no doubt responsible for their common name.

*S. dawsoni* was first described by Verrill in 1880 and is one of approximately 1600 species of seastars. It has a range of habitat that extends from Alaska to central California, preferring a rocky substrate on which to dwell. It is found at or below the extreme low tide mark and at depths up to 1000 feet. Coloration varies from yellow, orange, and red to purple-gray with several combinations in between.

One of the most discernible physical features of the sun star, eluded to above, is their curious assortment of arms. The arms, or rays as they are known in technical parlance, usually add up to 12 in *S. dawsoni* but may vary from 8 to 15. A closely related species that shares the same genus and much of the same habitat range, *S. stimpsoni*, normally possesses 10 rays. Incidentally, I have noted in the literature that *S. stimpsoni* is apparently the favored bill of fare of *S. dawsoni*.

The mouth of the sun star, as with all members of the subclass *asteroidea*, is located in the center of the underside of the disc (the center portion of the body). The entire undersurface of the disc and rays is referred to as the oral surface. The upper side of the body is called the aboral sur-

face. As stated in *Invertebrate Zoology* by Robert D. Barnes (1980), "From the mouth extends radially a wide furrow into each arm. Each furrow (ambulacral groove) contains two or four rows of small tubular projections, called tube feet or podia. These tube feet are the locomotor organs and form part of the water-vascular system."

A most distinctive and unique feature of echinoderms is their water-vascular or ambulacral system. In seastars this is a system of water-filled canals and appendages that terminate in hydraulic structures, the tube feet or podia. The overall function of the system is to achieve locomotion. However, the function of the tube feet is not limited to locomotion. They are also important in gas exchange and sensory reception.

As if cannibalism and water-vascular systems aren't enough, these critters can even regenerate lost arms. If an arm should be expended due to some unpropitious act of nature, another equally fine arm will be regenerated in its place (Now that's a trick modern medicine has yet to match).

**Author's note:** For further information about the sun star and other species of *asteroidea* consult the following monographs - *Pacific Coast Subtidal Marine Invertebrates* by Gotshall and Laurent (1979), and *Physiology of Echinoderms* by Binyon (1972).





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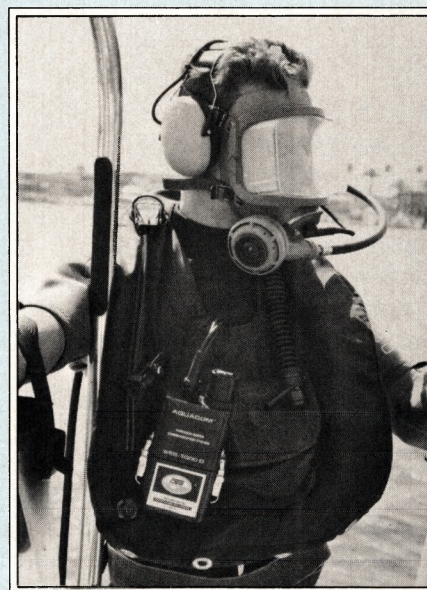
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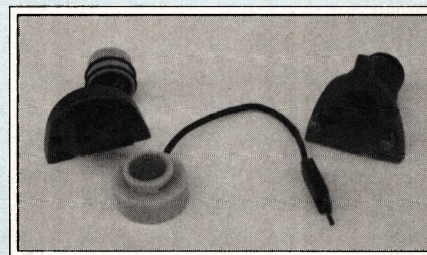
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# A Silent World No Longer

## Part II



*Ocean Technology System's Aquacom SSB 3000*

**By Michael Menduno**

**O**ur goal in reviewing five of the leading communication systems on the market was two-fold. First we wanted to provide sport divers with a good description and comparison of these products and

their features—what to look for and what to look out for. Second, we wanted to offer an independent “in vivo” evaluation of these systems to determine whether or not they worked as claimed, and how well they performed.

Our evaluation procedures were pretty straight-forward. They were meant to be representative of the machinations that a typical sport diver might go through in deciding to purchase a communication system. They were not meant to be those of a product testing laboratory.



## Diving Trends

Beginning in the pool, we familiarized ourselves with the gear and its operation, made any needed adjustments and adjusted to the strange but important face-masks that accompanied the communications systems. From the pool, we headed out to the ocean for side by side diving, and testing. Our dives were conducted in

Monterey Bay and in Los Angeles Harbor at the College of Oceaneering pier.

Before going through the review, there are a couple of provisos of which readers should be aware. First, it was our experience that communication gear takes some getting used to. The situation is analogous to learning to dive with a drysuit

having only used a wetsuit before. Initially, full face masks and mouth masks can be awkward and difficult. Also, voices sound different underwater and at times can be hard to hear, particularly when listening over your regulator's exhaust bubbles. Practice definitely improves performance.

**Table 1**

### Underwater Communication Systems Technical Specifications

Technical Specifications	Aqua Vox	Life Technologies Communication USC - 101	Ocean Technologies System SSB - 3000	Orcatron Scubaphone	IUC Signing System
Model	Sport	Sport	Sport	Commercial	Sport
Operating Frequency	.3 - 4 Khz (voice band)	32 Khz	33 Khz	30 Khz	N/A
Accoustic Output	.1+ Watt	1 Watt	.5 Watt	1 Watt	N/A
Range	3 - 6 Meters (no hood) 1 meter (with hood)	200 meters	350 meters	1200 meters	Visual
Form	Mouth piece	Transmitter	Transmitter	Transmitter Headphones	slate
Size	5" X 3" X 3"	7" X 3.6" X 2.25"	6" X 3.6" X 1.8"	Headphones	6' X 9" X 1/6"
Weight	Nominal	2 lbs	2 lbs	2.75 lbs	Nominal
Battery	N/A	8 AA cells Nicad optional	8 AA cells Nicad optional	12 volt Nicad	N/A
Battery Life	N/A	6 hrs @ 10% duty cycle	12 hrs @ 20% duty cycle	14 hrs @ 15% duty cycle	N/A
Price range Diver Unit Surface Unit	\$99 N/A	\$499 \$1769	\$430 \$790	\$1,530 \$2,450	\$12.95 slate \$45.00 course



We dived the units until we were comfortable with the gear. This came at the end of our testing, not the beginning. It's possible that the opinions below (such as the preferability of bone conduction oscillators over earphones, or push-to-talk versus voice activation) might change after prolonged use.

Second, as most manufacturers will point out, sea conditions, including turbulence, background noise, and marine life can significantly effect system performance. So can location. For that reason, we tried to dive the systems side by side when possible.

Third, we didn't verify each system's

maximum range. All of the systems, with one exception, work within buddy ranges and then some. Finally, we attempted to review each system on an apples to apples basis, though we had bananas and oranges. It's hard to compare the performance of IUC's signing system for \$12.95 and the Orcatron Subphone for \$1,500.00

**Table 2**

## Underwater Communication Systems Features & Performance

Features	Aqua Vox	Life Technologies Communication USC - 101	Ocean Technologies System SSB - 3000	Orcatron Scubaphone	IUC Signing System
<b>On/Off Switch</b>	N/A	Immersion	Immersion	Manual	N/A
<b>Mask</b> (standard)	Proprietor mouthmask	Proprietor mouthmask	Proprietor several options	Aga Mask	N/A
<b>Mask</b> (options)	None	Custom commerical Unit: EXO Mask	Variety of options	Custom	N/A
<b>Hearing System</b>	Unassisted bone conductor	Dual electronic bone conductor	Single bone conductor	Audio ear-phone conductor	N/A
<b>VOX</b> <b>Push to talk</b>	N/A	VOX: <small>New model has 2 way diver activated push to talk switch mounted on mouthmask</small>	Push to talk: <small>Commerical unit offers 2 way diver activated VOX/PTT switch on transmitter</small>	Push to talk: <small>Mounted on mask</small>	N/A
<b>Gain Control</b>	N/A	Automatic	Automatic	Manual	N/A
<b>Squelch Control</b>	N/A	No	Yes	No	N/A
<b>Diver Adjustable Settings</b>	N/A	Yes	Yes	No	N/A
<b>Performance</b>					
<b>Voice Clarity &amp; Intelligibility *</b>	2	3.5 — 4.25**	3.75 — 4.5**	3 — 3.25**	N/A
<b>Distortion &amp; Bubble Noise</b>	"Listen between breaths"	Some	Good separation between voice & noise	Bubbles impacted hearing	N/A
<b>Transmitted Noise</b>	None	Minor	None	"hisses & squawks"	N/A
<b>Shadowing Problems</b>	Yes	Not noticeable	Not noticeable	Not noticeable	N/A

\* Based on a subjective scale of 1-5: 1 = inaudible, 5 = excellent

\*\* Dives made at two different locations which could account for minor differences.



## Diving Trends

plus. They are different fruit. We did our best. The results of our evaluation are shown in Tables 1-4 on pages 24 - 27.

### Comparison Tables

Table 1 shows the technical specifications and provides an overview of each system's specifications and general price

range.

Table 2 shows the Features and Performance of each of the units and discusses the key user features of each system and the results of our performance review.

Table 3 indicates the ease of use, training, and surface communications and

other models that are available. This table compares the comfort and ease of each system, training materials provided, and provisions for surface communication and a listing of other models produced by each company.

Table 4 is an overview of candid comments. It summarizes what we liked

**Table 3**

### Underwater Communication Systems Ease of Use, Training, Surface Communications

Ease of Use	Aqua Vox	Life Technologies Communication USC - 101	Ocean Technologies System SSB - 3000	Orcatron Scubaphone	IUC Signing System
Mask/headset comfort*	4.5	3.0	4.0	3.5	N/A
Ease of assembly	Very Good	Average	Good	Excellent	N/A
Removal In water	Excellent	Average	Very Good	Very Good	N/A
Buddy Breath	Yes	Yes	Yes (with mouthmask)	No (not with Aga)	Yes
<b>Training</b>					
Manual	Excellent	Average	Average	Average	Excellent
Video	Excellent	N/A	N/A	N/A	N/A
<b>Surface Unit</b>					
Available	No	Yes	Yes	Yes	No
Acoustic Output	N/A	2 Watts	12 Watts	5 Watts	N/A
Size Weight	N/A N/A	8.5" X 9" X 5" 9.9 pounds	14" X 11" X 9.9" 22 pounds	15.5" X 10.5" X 13" 22.5 pounds	N/A N/A
Battery	N/A	12 volt rechargeable	12 volt rechargeable	12 volt rechargeable	N/A
Tape player output	N/A	Yes	Yes	Yes	N/A
Video annotation	Acoustic	Electronic	Electronic	None	N/A

\* Based on a subjective scale of 1-5: 1 = poor, 5 = excellent



about each system and what we didn't. We tried to be fair and accurate.

During the course of diving these products, we developed preferences for some features, aversions for others, and opinions about most of the rest. Here's a few of them.

## Masks

Our preference (as unencumbered sport divers) was for mouth masks. The mouth masks we evaluated varied in comfort. All of them needed work. Manufacturers seem to be aware of this and are addressing it.

## Bone Conduction vs. Earphones

Our preference was for bone conductors. They offered better clarity and seemed to better separate out voice communication from bubble noise than did earphones.

**Table 4**

## Underwater Communication Systems Comments

LIKES	Aqua Vox	Life Technologies Communication USC - 101	Ocean Technologies System SSB - 3000	Orcatron Scubaphone	IUC Signing System
	<ul style="list-style-type: none"> <li>Really liked the concept</li> </ul>	<ul style="list-style-type: none"> <li>Sound was very clear</li> </ul>	<ul style="list-style-type: none"> <li>Best sound of all the systems we used — clearly separated sound from noise</li> </ul>	<ul style="list-style-type: none"> <li>Very easy to connect / disconnect underwater</li> </ul>	<ul style="list-style-type: none"> <li>Easy to use and low cost. Logical and easy to learn</li> </ul>
	<ul style="list-style-type: none"> <li>Great mask</li> </ul>	<ul style="list-style-type: none"> <li>Anticipated problems with the transducer cable, but worked out fine</li> </ul>	<ul style="list-style-type: none"> <li>Liked chest mounting and push to talk. It was convenient and it worked</li> </ul>	<ul style="list-style-type: none"> <li>Surface unit carrying case is well thought out</li> </ul>	<ul style="list-style-type: none"> <li>It works well!</li> </ul>
	<ul style="list-style-type: none"> <li>Very comfortable, thoughtful quick-release</li> </ul>	<ul style="list-style-type: none"> <li>Liked user adjustable settings</li> </ul>	<ul style="list-style-type: none"> <li>Squelch control appears to be a good feature. It cut down the noise</li> </ul>		
	<ul style="list-style-type: none"> <li>Good low-cost way to annotate video</li> </ul>	<ul style="list-style-type: none"> <li>The VOX unit worked well from an operation perspective</li> </ul>			
DISLIKES	<ul style="list-style-type: none"> <li>It's really difficult to hear, though it does improve with practice. It's <b>NOT</b> made for use with a hood unless it has special hearing openings</li> </ul>	<ul style="list-style-type: none"> <li>Liked mask option but felt it could be improved. It felt stiff and awkward and the release was not "quick"</li> </ul>	<ul style="list-style-type: none"> <li>There wasn't that much I disliked about the Aquacom. It's a well thought out unit.</li> </ul>	<ul style="list-style-type: none"> <li>The Scubaphone seemed to have the most distortion and was harder to hear than the other electronic units tested</li> </ul>	<ul style="list-style-type: none"> <li>Requires training <b>With buddy</b>, however, remembering only a few signs helps and improves communication</li> </ul>
		<ul style="list-style-type: none"> <li>Did not like the VOX "transmission on" tone. It started to get disturbing to compete against voice and bubbles</li> </ul>	<ul style="list-style-type: none"> <li>The OTS mouth mask was second to the AquaVox unit in comfort which leaves it with some room for improvement</li> </ul>	<ul style="list-style-type: none"> <li>Headset unit became awkward and heavy after wearing it a while</li> </ul>	
		<ul style="list-style-type: none"> <li>The bone conductor did not work well with a hood. The cables were too short to fit comfortably inside a hood</li> </ul>		<ul style="list-style-type: none"> <li>Perfer bone conductors to Scubaphone's earphones</li> </ul>	



## Diving Trends

### Voice Operated (VOX) vs. "Push-to-Talk"

Underwater communication systems offer "simplex" communications like CB radios. You can talk or listen, but you can't do both at once. They are not like a telephone. That's why a switch is needed.

Vox is good in concept but it still

requires work. We found the "push-to-talk" switches simpler and probably more reliable. There are times when both of our hands could be busy, but that doesn't happen too often. However, photographers and other specialists may want to consider a VOX system. Also, in an emergency, when both hands were occu-

pied, having a VOX unit could be critical.

### Performance (Voice Clarity/Lack of Distortion)

Overall, all systems performed pretty much as claimed with few exceptions. We were a little surprised that performance varied noticeably among systems. All technology is apparently not created equal.

### Surface Communication

When we started our evaluation, we didn't consider the value of surface communications units. After all, we were divers and we wanted to talk underwater, not to the boat. Did we learn. Being able to talk to the boat, another surface station, or even a tape recorder is a very useful feature.

If you're serious about communications, plan on shelling out the bucks for a surface unit too. You'll want one.

### User Friendliness

All of the units without exception were easy to use and did not require a lot of training, though practice helped.

### How Does An Underwater Communications System Work?

Most underwater communications systems consist of a surface unit and one or more wireless diver units which have four basic components:

*continued on page 29*



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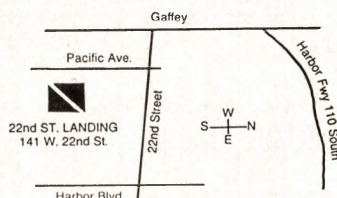
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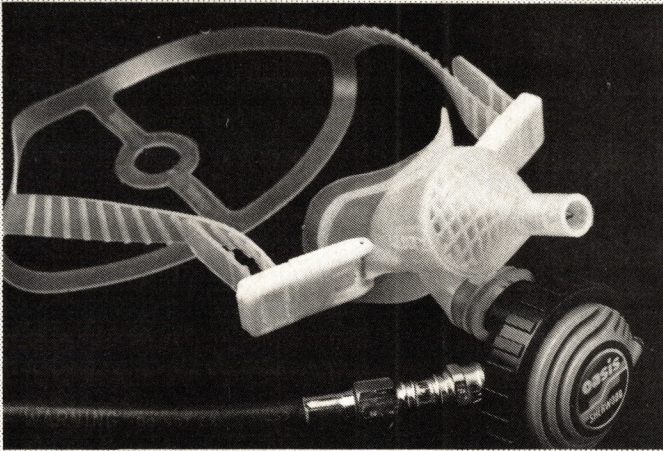
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### Communications Without Electronics



*The AquaVox mouthpiece*

Not all of the new systems on the market utilize ultrasound and electronics.

#### AquaVox

AquaVox Inc. of Cape Canaveral, Florida, has developed a "voice-based" system, by the same name.

The AquaVox is a special platinum-cured silicon mask that projects a diver's voice directly into the water. To hear divers rely on the natural bone conduction ability of their bodies.

Because it doesn't use ultrasound or electronics, the range of AquaVox is limited to "buddy system" distances. Like all communications systems, it re-

quires practice to use, particularly in hearing. However, the more you use it, the better it gets.

Without a hood, the working range seems to be ten to fifteen feet. The range is directly related to practice. Wearing a hood makes it difficult or nearly impossible to hear. Fortunately

several companies have designed hoods with ear flaps for use with the AquaVox. The company can refer you to them.

The AquaVox is a low cost way (\$99.99) to experiment with underwater communications. It also seems like a good way to narrate your underwater video and the mouth mask is one of the most comfortable on the market.

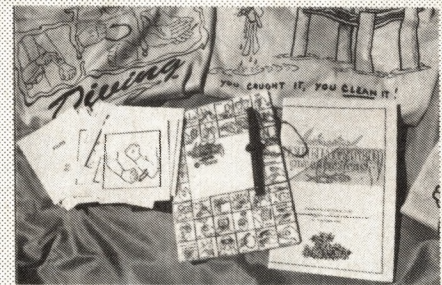
#### IUC

A second non-electronic communication system is the International Underwater Communications (IUC) signing system. IUC has developed an international diver "signing" system that is similar to

those used by the hearing-impaired. The system was first created in 1984, and is now in practice in at least fourteen countries.

The signs were developed by divers so they are logical and they work. All of them use hand movements to communicate with your buddy and others. The majority of them are universal in nature, and they cut across language barriers.

The company offers lots of ways for you and your dive buddies to learn the



*IUC's slate and training system*

system. There are courses and books and a videotape and flashcards. There is also a very useful slate with picturegrams to remind you of the signs if you forget. You can also use it to point to signs if you don't want to make the movements. All of these are low priced, for example, the book and slate are \$12.95, and the video course is \$45.00. The system is effective and works.

### Microphone and Airspace

The microphone, typically mounted in a full face mask or mouth mask, converts a diver's voice into electrical impulses. The special mask provides the airspace for the diver to talk.

### Filtering and Modulation System

In most systems, electronics filter out erroneous noise and encode the voice signal from the microphone for transmission using either an AM, FM, or SSB modulation scheme. The electronic one is also used to decode incoming signals.

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## Diving Trends

### Transducer

The transducer, also known as a hydrophone, converts the encoded electrical signals to sound waves in its specific operating frequency range, and sound to electrical signals. They are used for both transmitting and receiving.

### Earphone Bone Conductor

The earphone or bone conductor converts the decoded signal back to audible sound waves.

The surface unit uses similar electronics and an underwater transducer or hydrophone to transmit and receive sounds from the water. It does not require special mikes or earphones.

The non-electronic "projector systems" such as the AquaVox, or even a rubber glove, are somewhat similar. Vocal

cords are used to produce sound using the device's airspace. Sound is projected (and focused, in the case of the AquaVox) directly into the water. The diver's skull bones pick up the sound, and the brain filters and decodes it.

### Our Recommendations

If you're serious about getting an underwater communication system or are seriously interested in learning more, contact the companies listed below and make arrangements to meet with them and to dive their gear. Then rest is up to you. You can put your money where your mouth is.

### Underwater Communication System Vendors

Here are the companies producing underwater communication systems for

sport divers. All of them would be happy to answer any of your questions or send you additional information. They are good people. Give them a call or write.

AquaVox Inc.  
P.O. Box 612  
Cape Canaveral, Florida 32920  
(407) 783-5672

Life Technologies Inc.  
5000 Buchan Street, Suite 606  
Montreal, Quebec, Canada  
(514) 733-7123

Orcatron Manufacturing Ltd.  
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*Continued on page 32*



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by Ken Loyst and Michael Steidley

*Diving with Dive Computers* is the only textbook devoted completely to dive computers and computer assisted diving. This text was developed from an original three part comparison series on dive computers that appeared in *Discover Diving* in 1988. Each chapter is designed so that it stands alone allowing readers to skip to chapters that might be more relevant or pertinent to their needs.

The text starts with background information about the History and Development of Dive Computers, The Physiology of Decompression Sickness, and other theoretical considerations. There is also a chapter that is strictly devoted to Safety Guidelines For Using Dive Computers. The features and actual performance of nine of the computers that are currently on the market are compared. Other topics covered include decompression diving and altitude diving. The final chapter deals with the Recognition and Treatment of Decompression Sickness. There are 11 chapters and 112 pages. Suggested Retail: \$ 9.95 paperback

### The Amber Forest

by Ronald H. McPeak, Dale A. Glantz, and Carole R. Shaw

This beautiful book is bound to be a best seller for divers. Explore the underwater world of California's enchanted kelp forests through the incredible underwater photography of two marine biologists who have devoted their careers to understanding this important ecosystem.

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### The Egyptian Red Sea: A Diver's Guide

by Eric Hanauer

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Eric Hanauer has certainly done his homework. He spent five seasons in Egypt during which he made nearly three hundred dives learning about the Red Sea and the surrounding country. He has done an excellent job of putting all the knowledge and excitement about this wondrous area into a beautiful text. No diver's experience is complete without a trip to the Red Sea and no trip to this area should begin without first reading this comprehensive guide. There are 9 chapters and 237 pages. Suggested Retail: \$ 19.95 paperback

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### What Kind of Mask is Best?

There are three basic options for a mask when using an U/W communications system. Here are some of your choices.

#### Full Face Mask with Positive Pressure

Full face masks with "positive pressure" are just that. They create and "pressurize" a small airspace over your face. The positive pressure (3-5 psi) keeps water out and insures the mask won't flood. The regulator is an integral part of the mask and there is a compartment to mount a microphone.

The Aga mask, which we tried out, is a good example. It has become a standard among commercial and military divers. The mask has a large facial pocket and an inner mouth mask, making it easy to talk and listen. It seemed to offer the best environment for underwater communications, but it does take getting used to.

First, the mask creates 2-3 pounds of positive buoyancy concentrated on your face. That means there is a tendency to keep looking up to God. People may think you are religious or anxious to get back to the surface. Fortunately it doesn't take long to adjust to it.

Also, the full face mask can play havoc with your buoyancy control at first,

particularly if you're used to using your breathing as a means for buoyancy adjustment. Initially with a full face of air you are less aware of your breathing and tend to burn up a lot more air; but don't be alarmed, It will settle back down with practice.

Because the full face masks were not designed to allow buddy breathing or alternative air use, some divers carry a spare scuba mask in their vest. In the event of problems, the diver simply removes the Aga, replaces it with a regular scuba mask, and then is able to use an alternative air source.

Also the mask was not designed for snorkeling on the surface, or manually inflating your dry suit on descent. (A problem that was missed in our pre-dive check which sqqueeezzzzed home the point.)

#### Full Face Mask Without Positive Pressure

Full face masks without positive pressure are masks with a "demand" regulator built in. The mask does not maintain pressure greater than the surrounding environment. There are several options in this category. The EXO mask, with built-in regulators, and the low cost Cressi-sub mask with a rubber mouth skirt, to which you can attach a regulator.

Though we didn't evaluate these masks, we were told by people who've used them that they are the best of both worlds. They provide an adequate air-space and give the diver a little more flexibility than positive pressure masks.

#### Mouth Masks

Mouth masks form an air pocket over your mouth that allows you to talk while providing a space to mount a microphone. There are several varieties of mouth masks on the market. Life Technologies offers a mouth mask with their sport unit, so does Ocean Technology Systems. Aqua Vox also is based on a mouth mask design.

Mouth masks also take some getting used to. On some people, the masks don't seal causing problems and discomfort—particularly true if they have a beard or mustache. Also, some of the masks constrain mouth movement and make it hard to talk, and to pronounce words like "potato", particularly if you are Italian—which this writer is.

The beauty of these masks is that they are less cumbersome than a full face mask. They are easily removeable and can accommodate buddy breathing, alternative air source use, snorkeling, or just kicking back on the surface.

from page 30

Ocean Technology Systems  
2610 Croddy Way - Unit H  
Santa Ana, CA 92704  
(714) 754-7848

I.U.C.  
(International Underwater Communications)  
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We would like to extend our thanks to the above mentioned manufacturers that supplied the equipment for our test dives.



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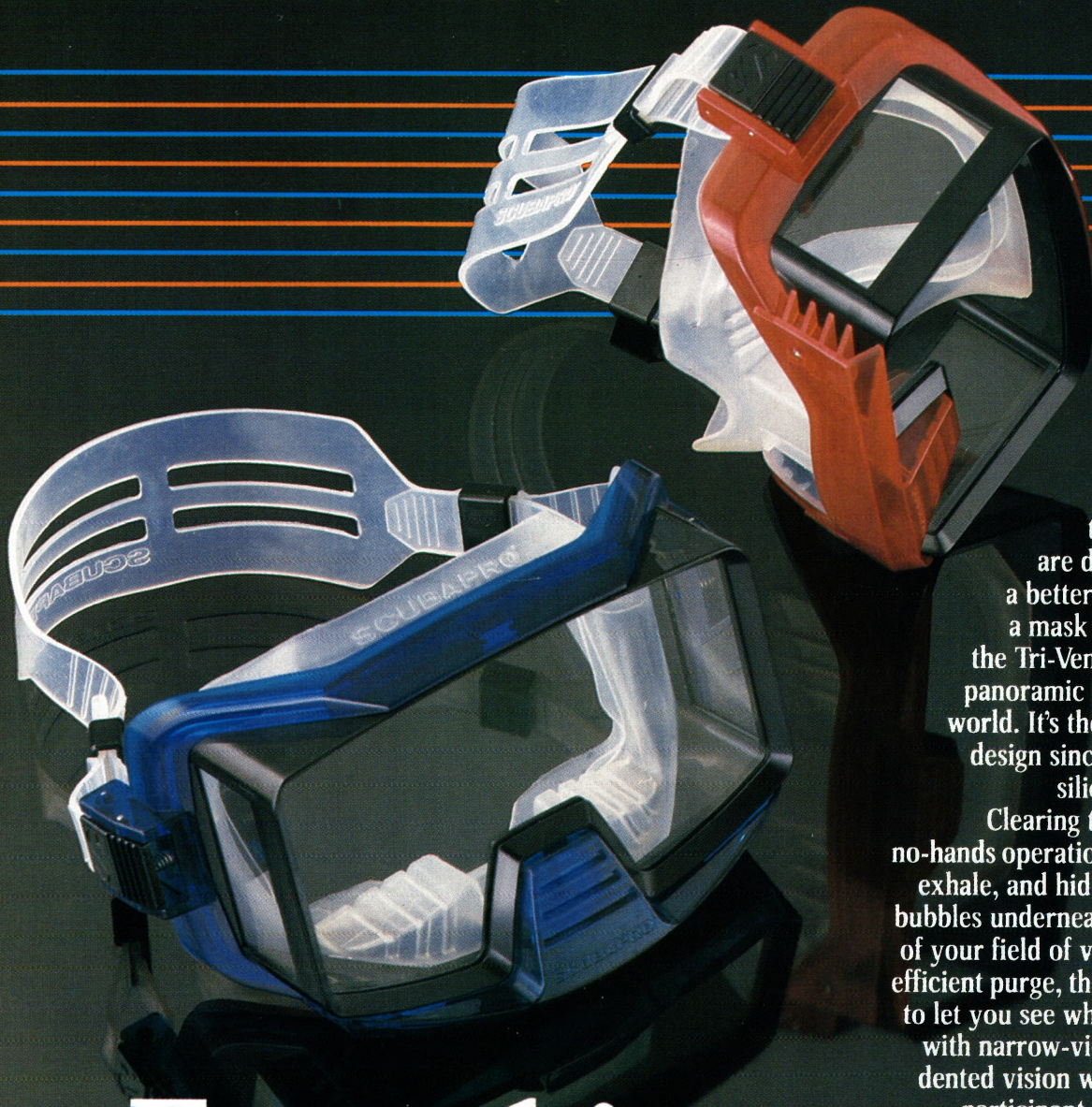
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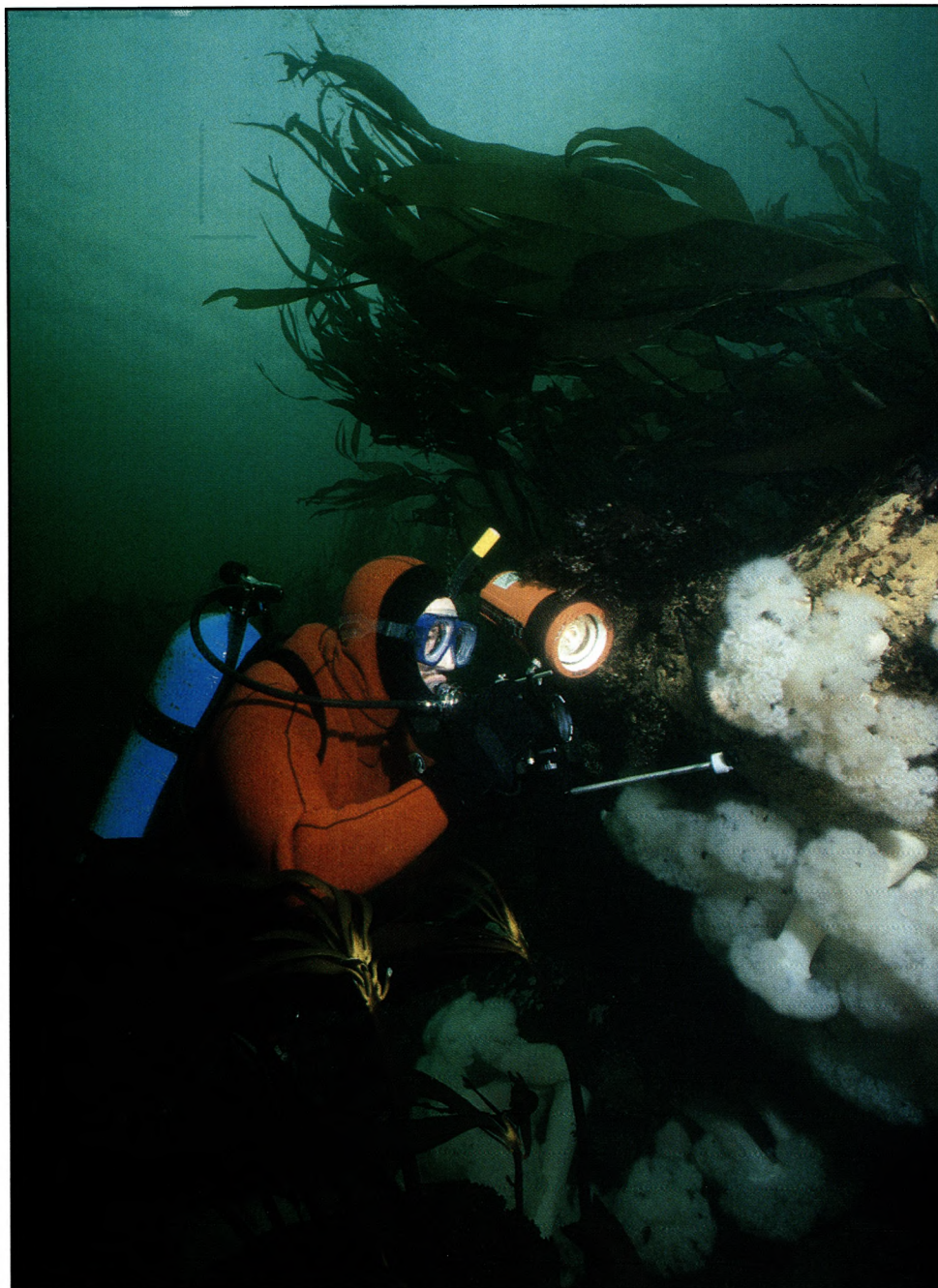
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*Diver photographs anemones off jetty.*

Edward Weber photo



# Washington's **Whidbey Island**

***Separating Puget Sound from the Strait  
of Juan de Fuca and reaching 55 miles  
into the heart of Puget Sound***

**Text and Photography by  
Edward Weber**

**T**ucked along the northeastern shore of Washington's inland sea lays Whidbey Island which separates Puget Sound from the Strait of Juan de Fuca. Whidbey is a long sinuous arm of land that reaches 55 miles into the heart of Puget Sound and lays claim to being the largest island within the lower 48 states. It was named in 1792 by explorer Capt. George Vancouver for Joseph Whidbey, a member of his expedition which explored Puget Sound. Whidbey led a small expedition of men who circumnavigated the island, determining that the land mass was not a part of the mainland.



## Pacific Northwest



Keystone Underwater Park shows the jetty in the foreground and the abandoned pier behind.

Ben Barrie photo

Today, long lazy country roads wind through a pastoral setting of farmlands, harbor communities and endless sandy beaches. However tranquil the countryside, the peaceful setting is often interrupted with the "sound of freedom" as Navy jets practice overhead. The Naval Air Station (NAS) here is a major influence and generates about two thirds of the island's economy. Oak Harbor on the northern part of the island is Whidbey's largest city with a population of 32,000. The economy here is quite diversified. Though Whidbey NAS is the vehicle which drives the major economy on the northern part of the island, agriculture and dairy farms support the island's interior. The southern portion of Whidbey is primarily

supported by a strong tourist trade from summer travelers and vacationers. One of the reasons Whidbey Island is as popular is because it is so accessible from Seattle and its surrounding communities. Whidbey is close, only 25 miles from Seattle as the seagull flies. The Washington State Ferry System services the southern tip of the island with a short 20 minute ferry ride from the seaside community of Mukilteo on the mainland.

By far the most popular diving area on Whidbey Island is Keystone State Park located about halfway down the island's west side, at the entrance of Puget Sound. A large man-made jetty extends 100 yards off shore and separates the Port Townsend Ferry Terminal on the right from the Un-

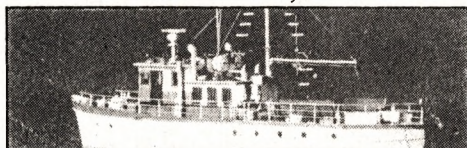
derwater Park on the left. The jetty is made up of large stacked boulders which tumble down to a sand and shale bottom. The currents off the end of the jetty can be treacherous at times, as all of the water which flows in and out of Puget Sound during tidal exchanges flows around the corner off the end of the jetty. It is necessary to consult a tide table or even better, a current table when planning a dive here. Most divers enter the water close to the jetty, make a short surface swim to deep water, and then descend. Once on the bottom you can stay in close to the rocks and pull yourself along, if there is any current present. The rocks along the jetty are carpeted with a thick jacket of white metridium anemones, which gives the entire seascape the appearance of a fresh underwater snowfall. The rocks serve as home to an explosion of invertebrate life which thrives along the current swept jetty. Gherkins, scallops, giant barnacles and a host of other creatures all vie for space among the rocks.

The dark holes between the spaces of rocks at the base of the jetty form a myriad of hiding places for some of Puget Sound's most interesting creatures. Giant octopus are often seen hiding here around the rocks. A good flashlight and a sharp eye will help you spot a den under the rock ledges. An occasional wolf eel will extend his ominous head to greet an intimidated diver.

One of my favorite activities on the jetty is to break open a couple of sea urchins and offer it to one of the many gluttonous kelp greenlings who live at the jetty's base. These brightly colored fish swarm about and eat greedily out of the

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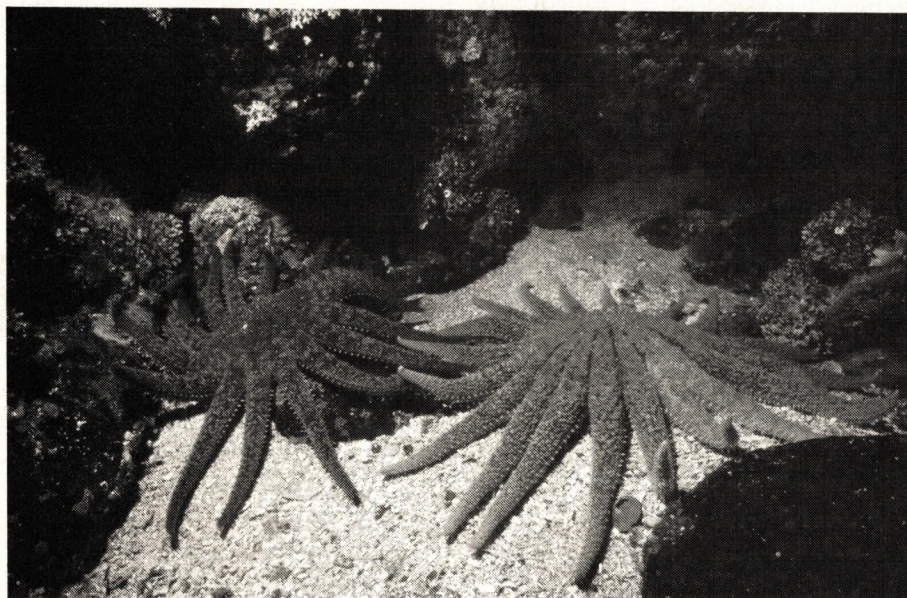


divers' hands, offering some excellent photo opportunities.

A great second dive is under the abandoned wharf to the left of the jetty. A colorful piling community of perch, rockfish and cabezon wander lazily about the sand and shale bottom. The pilings themselves host colorful purple tubeworms, encrusting sponges and other critters commonly found among the pilings in the Northwest.

Topside, Keystone State Park offers hot coin-operated showers and an outside gear rinse area. For an exciting after dive excursion, explore the historic Fort Casey which is adjacent to the park. Fort Casey was built in 1889 during the Spanish-American War, along with Fort Worden across Admiralty Inlet, and Fort Flagler on Marrowstone Island. The forts formed what was known as "Death Triangle" Any enemy ship entering Puget Sound would have to pass within range of the large cannons installed in the forts. Old bunkers and gun emplacements make for exciting exploring and offer a fun setting for an after dive picnic.

The north side of the island is accessed via the Deception Pass Bridge. This spectacular span stretches across the 500 foot granite corridor of Deception Pass. Arguable the most treacherous diving site in America, Deception Pass has been termed suicidal by many experienced divers who have taken on her currents. The tide tumbles and roars through this narrow corridor at speeds often exceeding 10 knots, resembling more a white water river than a salt water passage. A few times a month, however, the heavens properly align to create a small tidal condition making the pass penetrable. It is during these conditions that divers are treated to a spectacular journey along these current carved ledges. The walls are covered with fiery red anemones, purple tube worms and other suspension feeders. Long yellow finger sponge poke their way through cracks in the rocks. Deception Pass must be dived from a live boat at slack tide only. Fred West of Whidbey Island Diving Center operates the only dive charter boat on Whidbey



*Giant sunstars on the Keystone jetty.*

Edward Weber photo

Island and dives Deception on a regular basis. Fred's knowledge, experience and expertise of Deception Pass makes him the best bet for those hearty souls who want to try Deception diving.

All in all, Whidbey Island offers an excellent weekend escape with dives sites appealing to any level of diver.

### Services

#### Washington State Ferry System

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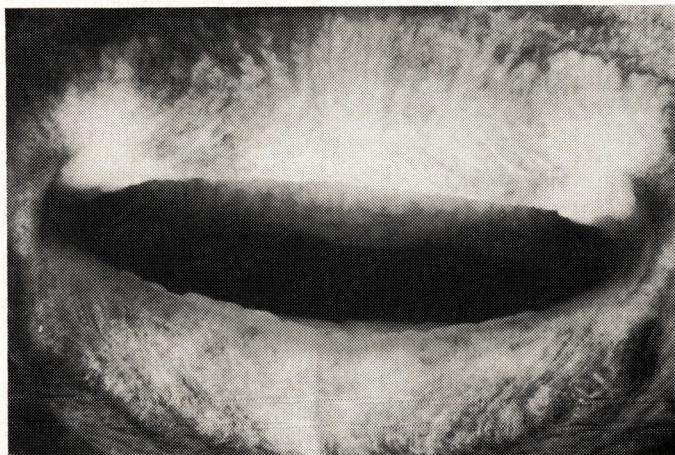
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## Shooting with a Plan

# Fish Photography



*A close-up of a puffer's mouth.*

**Text and Photography by  
Marty Snyderman**

**F**ish chasers rarely acquire good photographs of fish. I know, I used to be one. Fish chasers are easy to identify. They are the ones swimming wildly from reef to reef waving their cameras at everything with gills. On the beach, on the boat, and at club meetings fish chasers can “talk a good game” with the best of photographers. But when it comes time to display their work, they usually realize that the magic photographs just never seem to materialize. I am not saying that fish chasers don’t have fun, at least at first. But more often than not for serious photographers, fish chasing eventually becomes an exercise in frustration rather than a pursuit of excellence.





*Moray eel being cleaned by a goby and Pederson's shrimp.*

What aspects of photography separate those photographers who can take excellent pictures of fish and those camera owners who really aren't quite that far along in their work? Certainly it is a lot more than just blind luck. Over the years, I have come to realize that consistently getting the photographs you want means (1) you must have an idea of the shot you want before you get in the water, (2) you must match your gear with your expectations, (3) you want to have at least some idea of how you want to approach or attract your subject, and (4) you need to know as much as you can about your intended subject. While these guidelines apply to almost every imaginable photographic situation, in this article I

*Dramatic shots (above and left) are the most difficult to obtain. Often you must be physically close to your subject and in some cases the fish must be doing something very interesting at the instant that you are close. You have to be able to think fast and to manipulate camera controls rapidly in many cases in order to be successful. If you see the potential for a dramatic shot, go for it immediately.*





*This shot is an example of the type of identification shot that is often preferred by the scientific community. The fish (here a juvenile garibaldi) is parallel to the film plane and the background is underexposed. The fish is not cropped by the edges of the frame.*


am going to make suggestions for photographing fish in the size range of 6 inches to 2 or 3 feet long - the typical size of many

species of reef fish. Remember we are talking about achieving consistent quality, not just an effort to be lucky every once in

a while.

Many species of fish are extremely photogenic, and fish are present on almost every dive you make, so the idea of thinking about exactly what you are going to do to track your photographic quarry before you enter the water might seem unnecessary. However, as we all know, often what "seems to be" is not "what is". Think about the underwater photographers that you know and you will likely agree with my belief that certain qualities consistently separate the work of the best photographers from the rest of the pack. Quite often, the difference is not so much what is done in the water, but instead revolves around the pre-diving planning.

When I first tried to plan out my fish

  
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*Animated shots provide a lot of esthetic appeal. The fish is best approached from 15 to 20 degrees off the head and with a slightly upward shooting angle. Many species rest on the bottom and shooting up often proves impossible. Slightly downward angles generally work well, though they are not preferred.*

photography dive, I found all the pre-dive effort to be difficult, and wondered how in the world all my thoughts were going to help me communicate with fish the way I communicate with a model. I soon discovered it was not the fish I trying to prepare for the photography session, it was me and my approach to the dive. Just like other endeavors in life, having a plan and thinking things through before they arise can make all the difference between snapshots that end up in your trash can and photographs that are printed for display on your living room wall.

Getting started planning can be tough, so here are a few suggestions. Try spending a few minutes the night before your dive reviewing the fish photographs in your

slide library and some of those in various wildlife publications. Look at the types of photographs you are pleased with, those you want to improve upon, and those you might like to imitate. They try to do two things. First, analyze what factors make you like certain pictures, and second, think about the details in those shots that you would like to try to duplicate the next day. Think about what you did to get the photographs you like and be prepared to beg, borrow, steal, or at least re-use or modify those details whether they were from images in your library or by other photographers.

I have my fish photographs organized into four categories. They are (1) identification shots - ID shots, (2) animated poses,

(3) fish in their natural environment, and (4) dramatic or behavioral images. My goal is to acquire at least one good image of every category of photograph for every species I film. By doing so I do two very

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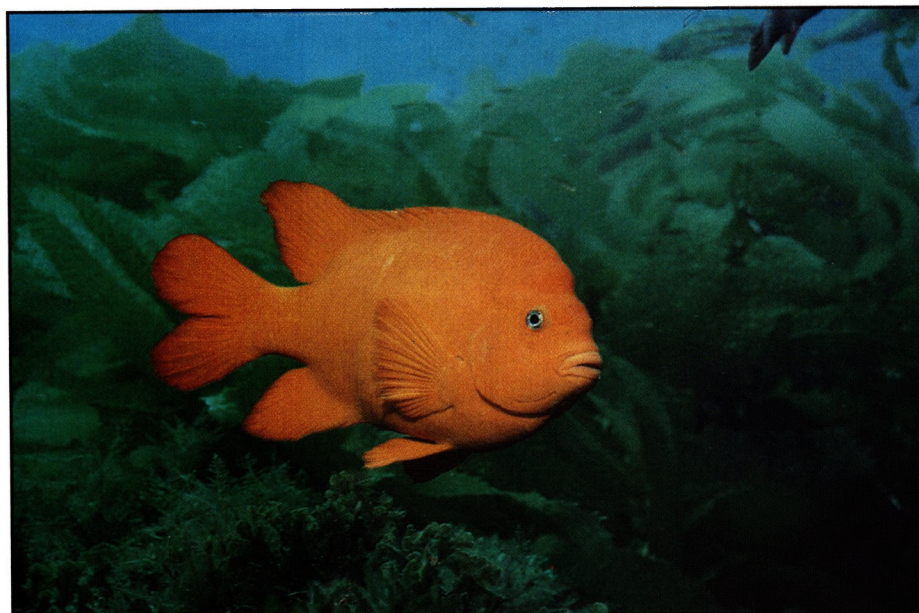
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## Photography



*Backgrounds and negative space (that part of the image that is not the subject) in images of fish in their natural environment immediately tell the viewer that the picture was taken in a natural setting. Ocean color water, kelp, reef, or neighboring animals such as an anemone can help provide that "natural" look. Here, a garibaldi swims in front of a kelp patch that provides the "natural" look.*

important things. First, I increase the number of subjects by a factor of four. Instead of wanting one garibaldi picture, now I need four so that I have one for each category. Second, I begin to think out the exact image of each fish that I would like

to take once I am in the water. I suggest that you try this approach, especially if at present you do not really have another system which is helping you get organized for your fish filming dives.

Identification photos are usually used

by aquariums or the scientific community simply to identify fish. Their purpose is not so much to be aesthetically pleasing as it is to make it easy to positively identify a fish from the image. ID shots are best made with the fish parallel to the film plane. The fish should be properly exposed and the background is preferably at least one step underexposed. Some users prefer the backgrounds to be absolutely black. The entire fish should be in the frame and all parts of the fish should be sharply focused.

Animated photographs emphasize some aspect of the fish's visual appeal. For that reason, the animated shots are usually my favorite and are the category I try to fill first when working with a species that is new to me. Approaching the fish from a 30 degree angle from either side of the face, and from 30 degrees above or below will yield the best results. I have a strong preference for shots looking slightly up. Head on shots are generally not as appealing as are more angular shots. Be careful to try to position the entire fish in the frame and establish critical focus on the eyes.

Environmental shots are often similar to animated photographs except that it is my intention to be sure that the viewer is keenly aware that the photograph was taken in open water, not in an aquarium. The best way to create the natural effect is to show something in the foreground or background that makes your point. Quite often that "something" can be just a hint of blue or green water, or a sparkle of sunshine streaming through the water.

Dramatic photographs include images that depict anything that is of special interest about the fish. Full frame face shots, capturing a specific aspect of behavior such as cleaning or feeding, and almost any type of action photograph will fit this category.

Now that you know the categories, it is important for me to emphasize that the categories are merely a place to start. Some images will fit into two categories, and that fact does not make the image unacceptable. For example, a photograph of an inflated puffer fish might show behavior and it might easily reveal that the picture



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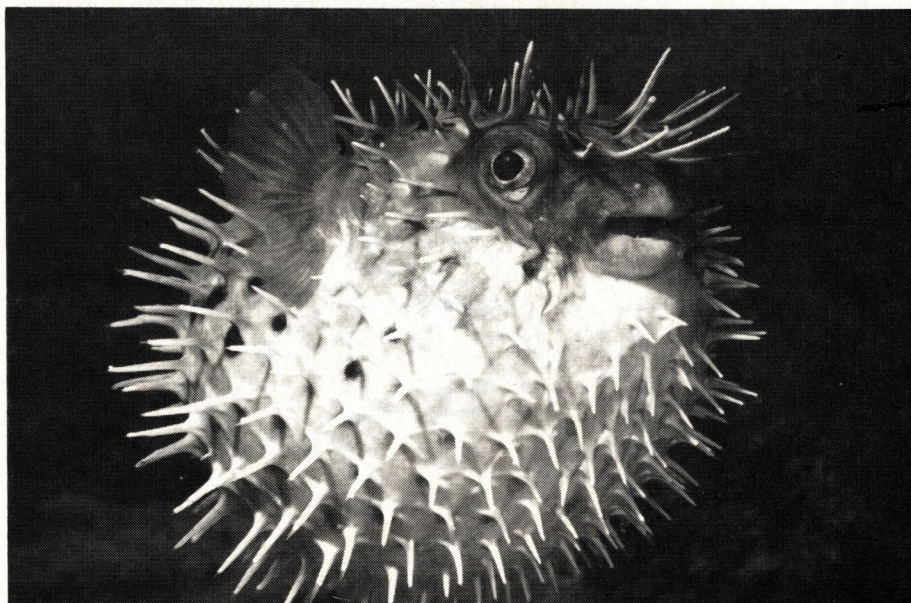


was taken in the ocean because you can see the boat anchored in the background. These photographic categories are a way to help you and me clarify our objectives, not judge the images.

While ID shots can be taken wherever you find fish, photographs for the other categories will likely need interesting backgrounds. Clean, colorful negative space (that part of the image that is not the main subject) often makes the difference between a snapshot and a photograph. Kelp, sea fans, purple coral are excellent examples of foregrounds or backgrounds that can be used to enhance your image and not distract from your picture. Knowing that you need interesting negative space, I strongly suggest that as soon as you enter the water you look for good negative space first, and then search for good subjects in the area around the negative space. This lesson took me years to learn, but is one I will never forget and whole heartedly suggest you try.

Matching your expectations with your equipment is critical. All photographic equipment is designed for specific purposes. As long as you use the gear within its design limitations, you have a chance to do your very best work. Once you ask a piece of equipment to do more than it was build for, you have a good chance of being disappointed with your results. When filming fish most serious photographers use single lens reflex (SLR) systems with 50mm or 55mm lenses, although some pros swear by 80mm and even 105mm lenses.

The need for precise framing in fish portraits can cause a problem for many underwater photographers. The reason is that many photographers use only Nikonos camera systems, and Nikonos cameras are range finders not single lens reflex cameras. The focus and framing systems on all models of Nikonos cameras are "guesstimates". For portrait work, you need to be able to see exactly what you will get on film. The exact positioning of a fish within the frame can make all the difference between that classic wildlife portrait and one you wouldn't frame for your garage. As an example, good ID shots require that the



*A puffer, fully inflated, poises in a dramatic shot. This photo falls into the "dramatic" category because the subject is doing something very interesting at the moment the shot was taken.*

entire fish be in the frame. Just barely cropping off the tail or a pectoral fin can make an ID shot totally unacceptable.

For the other categories, cropping is acceptable, although it is usually either not the best choice, or exactness in cropping is required. As an example you might choose to end your frame at the exact place where the pectoral fin connects with the body. An inch either way could prove to be very distracting and ruin your photograph. Because precise framing is so critical in fish photography, I really suggest using a housed SLR camera system with a 50mm or 55mm lens. I love to use Nikonos cameras for wide angle work and for macro

subjects (extension tube sized), but the absence of SLR viewing makes fish photography with a Nikonos system difficult. In addition, Nikonos does not manufacture a lens in this range. Nikonos jumps from a 35mm lens to a 80mm. Minimum focus and depth of field problems make using a non-SLR system very difficult with either lens when your goal is take a well composed, sharply focused photograph in which the fish fills a large percentage of your frame.

While some photographs that show a fish tail are interesting, it is almost always best to photograph your subject face-first. Be certain that the eyes are sharply fo-

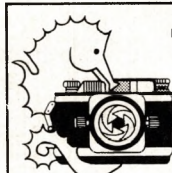


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*A little bait often encourages fish to overcome their wariness about divers and can help photographers get close to their subjects without frightening them.*

cused. Out of focus eyes, even soft focus, and out of focus facial features are usually horribly distracting. If depth of field dictates that some part of the fish be out of focus, place that portion as far away from the eyes towards the tail as possible.

If the fish you want to film is moving, it may be easiest to bracket by shooting two or three frames at what you believe to be the correct exposure, then shoot several shots at one f/stop higher and one f/stop

lower. If your subject is not moving, shoot one frame at each aperture, then change your angle and bracket again keeping in mind the types and numbers of images you need to fill out your library.

Achieving your goals is much easier when fish cooperate. One way to help ensure their cooperation is to bait the fish into camera range. I have found that anchovies work well with many California reef fishes. Be careful that left over bait does not float up into frame while taking the shot, not so much because you never want anyone to know that you baited your subjects, but because out of place bait is usually very distracting. And be sure to put the bait in the container that is manageable. You want to be able to control exactly where you put the bait and how much bait you utilize.

The only real point of concern when it comes to baiting is that it is possible to get bitten by either the fish you are working with or by moray eels or other reef residents. My suggestions are to take only a little bait until you become comfortable with the ideas of baiting, to place the bait in some kind of sealable container so you can control exactly when and how much bait enters the water, try to attract fish to you by

creating an odor of bait in front of you, not by hand feeding, and never lie down on top of the container while you are working. Remember reefs are full of holes and even when you are directly on top of the bait, eels can appear out of what appeared to be a solid bottom.

Whether baiting your quarry or not, your approach is very important. You need to get into just the right position without spooking your subject. Usually I try to settle down on the bottom and crawl ever so slowly toward my subject keeping as low a profile as I can. When possible, I try to approach from down current so that any sediment I kick up will be washed out of the way rather than on top of my photographic subject. When ready to shoot, I often pause in my breathing just for an instant, though you obviously should not do so unless you are certain you will not drift up or be forced up by the surge. Rather than having to focus at this critical juncture, when using a housed SLR system I often pre-focus the lens and then just move the camera ever so slightly back and forth to achieve critical focus.

I also find it helpful to read about fish before I try to photograph them. You can learn about facts such as when and where they nest, what the nest looks like, and how the eggs are protected. You might also learn a fish's favorite food source, where it sleeps, and how it tends to behave around bubble-blowing intruders. All of these facts can help put you in just the right position at just the right time.

The suggestions outlined here are not secret rules from some photographer's little black book. Instead they are an outline of an approach that has worked for me. Whether you choose to use my suggestions or modify them to fit your already existing methods, I am absolutely certain that if you pre-visualize your desired photograph, enter the water with a plan, have realistic expectations for the equipment you are using, and try to read and learn about your potential subjects before your dives rather than afterwards, you will achieve better and more consistent results.



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**B**ula. This issue of Discover Diving introduces a special section on Fiji, the Northern Group. Following is an examination of the Northern Group (excuse the pun) in greater depth.

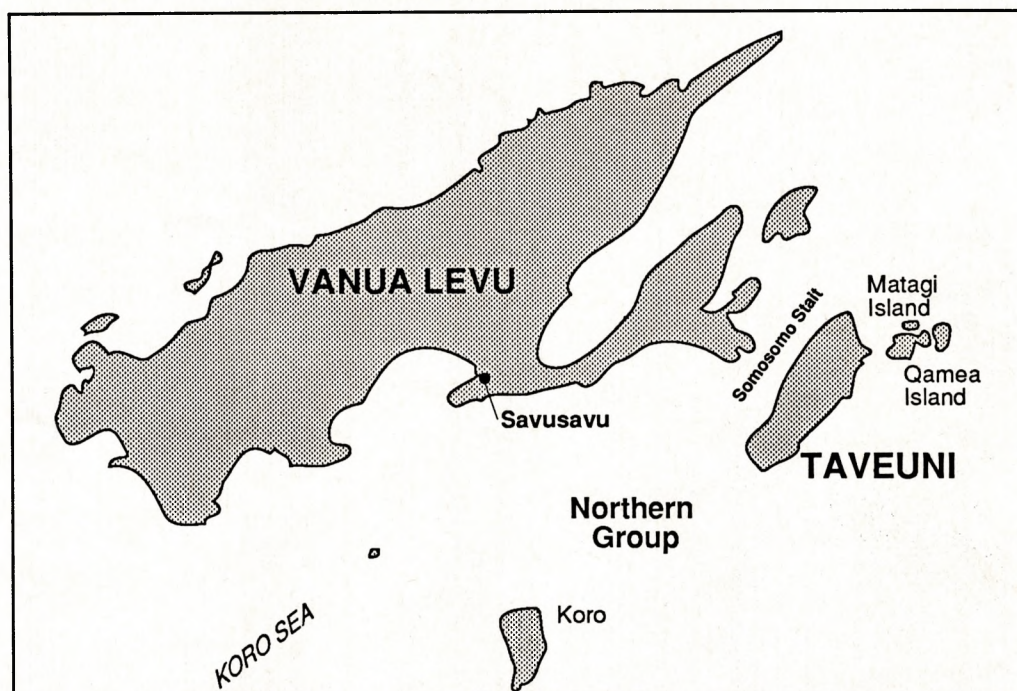






## Discover Diving Dives Fiji

# The Northern Group



Text by Michael Steidley

Photography by Michael Steidley, Jolee Brunton, and Ken Loyst

**T**he editors of *Discover Diving* magazine recently lead a group of 23 divers to Fiji, that was flawlessly arranged by Tropical Adventures Travel of Seattle. It was an incredible adventure with exquisite diving. As a matter of fact some of the best diving that we had ever seen.

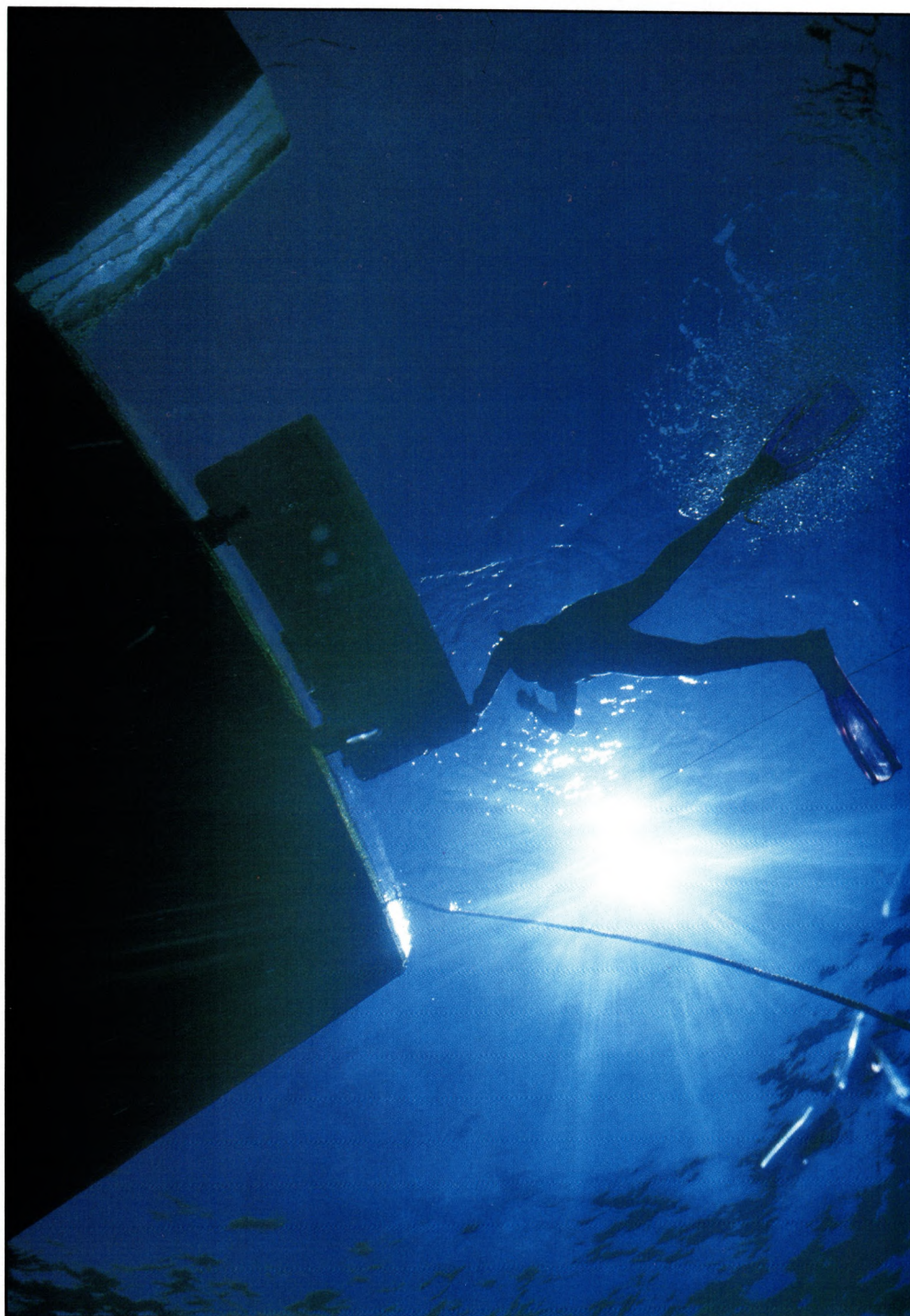
The diving in the Fiji abounds with

sights to see. There is a plethora of hard corals and the splendid pastel colored soft corals are absolutely beautiful. The marine life is abundant and diverse, ranging from the small colorful clownfish playing in their sea anemone homes to inquisitive turtles slowly gliding by. Fiji is an underwater paradise that will delight underwater explorers and photographers. Fiji has it all.

The main group spent the first week on the island of Vanua Levu at Kontiki Resort and the second week on the island of Taveuni at Dive Taveuni. During this time, I also travelled to four other resorts and visited two additional islands.

The following is both an adventure story about our trip and a guide to diving the northern islands of Fiji. As usual, it is





Ken Loyst photo

the mission of Discover Diving to provide our readership with the necessary information to have a good dive trip to Fiji. We hope you enjoy sharing our Fijian adventure. Most of all we hope you find the information about Fiji to be useful as you plan your own diving adventure to Fiji.

## Getting to Fiji

Our group was predominantly made up of people from the San Diego and Los Angeles areas or the San Francisco Bay area. The majority of the people had traveled with us before. We all met up in Los Angeles to catch our plane to Fiji.

Unfortunately, I was running late. I had just returned from a week long assignment on board the M/V Ocean Spirit. I arrived in San Diego to pick up clean clothes and collect some of my extra tropical water gear. Trying to tie up loose ends before I left had definitely put me behind schedule.









Jolee Brunton photo



Ken Loyst photo



Ken Loyst photo



Ken Loyst photo

Ken Loyst photo

The drive to Los Angeles from San Diego was harrowing. The traffic was miserable. My blood pressure probably had risen off the scale. I arrived at the Los Angeles International Airport exactly one hour late for our appointed check-in.

I grabbed my gear and pulled an O. J. Simpson run down the airport. O. J. would have been impressed. On my back was my backpack style dive gear bag with two complete sets of warm water dive gear. Across my left shoulder was my duffel bag with a two week supply of clothes. Across my right shoulder was my camera bag with two complete underwater camera systems and my entire land camera system. As I dashed around the corner, I saw the Qantas counter. The line was incredible and I suddenly realized that I was going to miss my plane. This was not a good start.

Redemption came in form of my editor and publisher Ken Loyst, who was waiting at the front of the line looking very perturbed. As usual, Ken knew I would make it and had been holding my spot at the counter. I was rushed to the counter and my bags were checked. I think it took at least an hour for my heart rate to slow down. I cannot overemphasize the importance of arriving at the airport two hours early for international flights. I had gotten lucky.

Ken rushed me over to the U. S. Customs to register my camera gear and watch so that I wouldn't have to pay duty on them when I returned to the States. It is a good idea to register any expensive camera gear or jewelry prior to leaving the United States on international travel.

*The Northern Group offers the most diversified diving among the Fijian chain. Clownfish are found playing in the midst of anemones (left), soft corals are more plentiful than other Fijian Islands (top two), a panoply of hard corals await discovery (there are over 380 species of hard corals) (third from top), and exotic marine animals, like this sea snake (bottom) are frequent.*



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We boarded our Qantas 747 and departed LAX at 10:45 pm. Our next stop was Papette the capitol of Tahiti. This first leg of our flight was seven hours long and we arrived at 3:00 in the morning. We had an hour-long lay over Papette.

*(Editor's note: Starting October 1, 1989, Qantas will connect through Hawaii.)* The second and final leg of our flight was four hours long and we arrived in Nadi. We found Qantas to be an exceptional airline — comfortable, friendly, and relatively painless.

Nadi (pronounced "Nandi") is the third largest city in Fiji. We cleared customs quickly and easily. As we exited the customs area, we were greeted with shell leis by Rosie's Tours who divided me from the group. We were all off to the second largest island of Vanua Levu and the resort Kontiki. We just had different means of transportation.

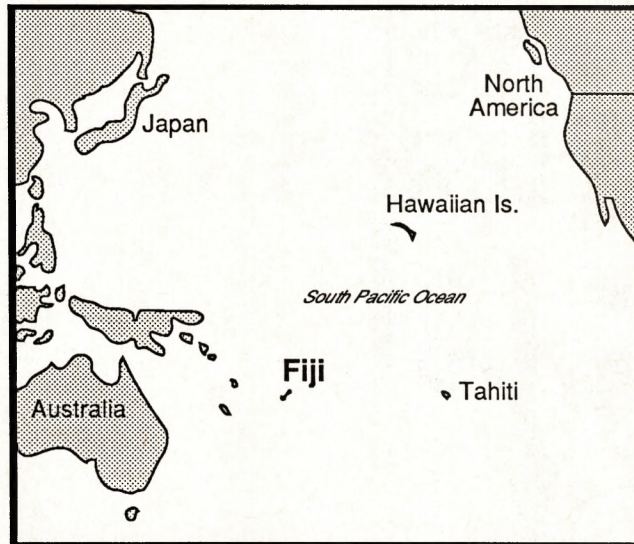
The Discover Diving group boarded two smaller planes in Nadi for the inter-island flight to Vanua Levu. My flight had been booked later than the rest of the group and there was no room left on the planes departing from Nadi to Vanua Levu that day. Therefore, I was to be transported to Suva via taxi to catch a plane to Vanua Levu from the Nausori airport. The trip by taxi took three and a half hours.

## From Nadi to Suva

The trip from Nadi to Suva was interesting. Immediately, the British influence in Fiji was noticed with people driving on the left hand side of the road as opposed to the right hand side of the road that we use in the United States. I had an Indian driver and tour guide named Hussain. As we neared the city after leaving the airport, my attention was caught by the mountain like speed bumps that Hussain informed me were called "sleeping policeman".

Hussain took it upon himself to edu-

cate me about Fiji. He shared a wealth of information ranging from geography to the people and their languages and customs to their economy and trade. The lesson was extremely interesting and much



of the information plus some extra notes will be detailed in the next sections.

Much of the trip was along the coast. We passed through a number of smaller cities on the way to Suva. The trip was enjoyable and a worthwhile excursion in itself. We arrived at Nausori airport after lunch at a delightful Chinese restaurant. Wherever you travel in the world it seems there is always a Chinese restaurant to be found

I got my first major surprise at the airport when they assessed me an excess baggage charge of \$20.00. On the smaller inter-island flights there is a baggage limit of 44 pounds per person. The bottom line is pack lightly (if this is really possible for a travelling scuba diver) or be prepared to pay for excess baggage weight. I paid my excess baggage fees and waited to board the plane.

Patience is a virtue while travelling in Fiji. The plane left an hour late and instead of flying to Vanua Levu as scheduled, it made an unscheduled stop at the island of

Taveuni to drop off a passenger. The detour and extra stop added about one and a half hours to the trip. It wasn't a total loss, since I talked the pilot into letting me sit in the co-pilot's seat so that I could take pictures. I got some great aerial photos and saw lots of beautiful scenery. He wouldn't let me fly the plane, however.

I arrived on Vanua Levu about two and a half hours late. The driver who picked me up asked if I minded stopping in town before going to Kontiki Resort where I would reunite with the Discover Diving group. Why not? I was in Fiji and I must be on Fiji time. My native driver neglected to tell me that town was in the opposite direction of the resort.

I arrived at Kontiki and reunited with my group. Ken thought I had probably just missed the plane or was lost at sea. The adventure had begun.

## About Fiji

Before describing the six dive resorts and the variety of diving on the northern island group I would like to share with you some information about Fiji and its people.

Fiji is composed of approximately three hundred islands, of which about one hundred are inhabited. The Discover Diving expedition actually went to the three largest islands in Fiji.

The largest island is Viti Levu where we initially entered the country. Viti Levu covers an area of approximately 10,388 square kilometers. Viti Levu contains about 70% of the Fijian population and is the hub of the entire archipelago. Suva, which is the capitol city, is located on Viti Levu. Suva is the largest city and also the chief port. The city of Nadi is the site of the international airport. Lautoka is the second largest city in Fiji and serves as a second port of entry.

Vanua Levu is located north east of Viti Levu and is the second largest island.



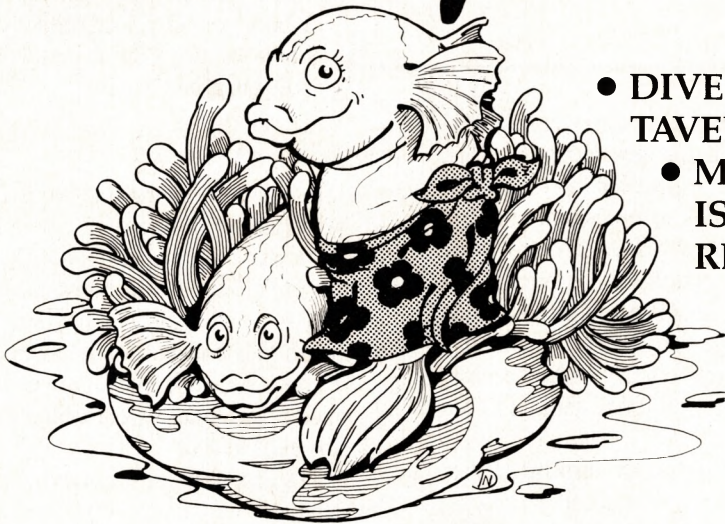


It is approximately half the size of Viti Levu and also serves as a center of population. There are three dive operations and resorts located on Vanua Levu.

The third largest island in the Fiji archipelago is Taveuni. Taveuni lies to the east of Vanua Levu. The two islands are separated by the Somosomo Strait which

is where some of the best diving in the world can be found. Taveuni is a mountainous island that hosts several beautiful waterfalls that may be visited.

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## Seasons

The diving in Fiji is good year round, for the most part. There are two main seasons in Fiji, winter and summer. The winter is considered to be the best diving season and runs from April to November. During this time the trade winds blow more favorably and the water tends to be more clear.

Winter in Fiji is the dry season, although it may be slightly windy, and as stated above corresponds to the summer months in the United States starting in April. Summer in Fiji is the rainy season, which means there will probably be about two hours of warm tropical rain each day. Other than these differences there is really very little change between the two seasons.

## Diving in Fiji

The diving in Fiji is incredible. People who have travelled and dived all over the world always list Fiji as one of the world's premier dive destinations. Within Fiji, the northern island group has some of the best diving to offer.

The warm clear tropical waters abound with a rich diversity of marine life. Located near Fiji is the "Tongan Trench" where an upwelling of nutrient rich water nourishes the marine life by bringing a constant supply of food.

The visibility range runs from lows of about sixty to seventy feet and to highs of a spectacular two hundred plus feet of visibility. The winter season from April to November typically brings the best visibility. The water temperature is warm and comfortable, generally in the 80° F range.

The diversity of marine life is amazing. It is said that there are more than three hundred varieties of hard corals in Fiji which make the mere thirty to forty differ-



# Meke

by Jolee Brunton

Can you imagine going to a local hotel, knocking on a door and inviting the visiting tourists to your home for tea and a dance recital, just to honor them and make them feel welcome in your city? In Fiji such invitations are often extended to guests on the islands.

The Discover Diving group had the privilege of being invited to a meke given for us by a local village named Wianmea. A meke, we were told, is a communal dance that combines singing, chanting and drumming, depicting historical events legends, and customs handed down through generations. That morning each of us had been given a sulu to wear to the village. A sulu is a rectangular piece of cloth about two yards long. The men wear them wrapped around the waist as a skirt, with a tee shirt, while women wear them tied in various ways. The women in our group experimented with different sulu wraps, while the men focused their attention on keeping their sulus tightly fastened.

Properly attired, we went to the village. Nestled in a jungle clearing by a stream, the village was comprised of about thirty bures (huts) and a small church clustered around a central open yard. The villagers greeted us with fragrant leis and escorted us to a thatched awning in the center of the circle of



Ken Loyst photo

bures, where mats and chairs were placed out of the sun. With shy smiles the Fijians served us tea and scones while the dancers readied themselves. There were about twenty men and women dancers, dressed in long grass skirts with grass arm bands and leis. The women wore bright fuchsia shirts that looked pretty next to their dark skin. They performed two dances, one telling the story of Fijian warriors, complete with spear-shaking threats, and the other depicting a wedding between a man and a woman from different islands. Each motion had its significance to the story. The movements are carefully passed down to preserve history and tradition. One trio of dancers appeared to be a father and his two teenage sons. The boys followed the

motions of their father from the corners of their eyes, verifying that their movements were correct ones. They smiled and rolled their eyes at each others' mistakes. Both dancers and audience thoroughly enjoyed the singing and dancing.

When the dancing was over we were invited to walk around the village. Some of the women brought out shell necklaces, baskets, tapa cloths, and shells to sell. The men brought out the kava bowl and the customary kava drinking ensued. All too soon evening approached and it was time to go back to the resort. We left the village feeling fortunate to have been invited into their homes, and hearts, to experience the warmth of their genuine hospitality.

ent varieties found in the Caribbean pale in comparison. The soft corals are spectacular taking on pastel colors of violets, oranges, reds, blues, and more. There is a wall in the Somosomo Strait between Vanua Levu and Taveuni known as the White Wall which is awe inspiring, covered with flowery white soft coral, flour-

ishing in the nutrient rich currents. The sea fans must be mentioned as well, growing to immense sizes along walls, and often decorated by blue, green, black, yellow, and orange crynoids.

Tropical fish abound in these waters. There are the colorful clownfish playing in their sea anemone homes, just begging

photographers to keep them company. Moray eels smile at divers peaking in holes, and poisonous yet beautiful lionfish may be seen sleeping under a ledges. There are moorish idols, butterfly fish, damsels, trumpet fish, puffers and just about any other type of tropical fish that a diver could imagine.





Sea turtles frequent the islands and are commonly seen gliding by. There are several species of shark that are seen in these waters, including white tip reef sharks and hammerheads. It is a treat to see these magnificent animals, although they generally stay well away from divers.

Diving in Fiji has something to offer every diver from the novice to the veteran underwater photographer. Logging dives in Fiji is an experience that will never be forgotten.

As a final note, most of the dive operations in Fiji practice "hands off diving". This means that during your stay at a diving resort you don't have to wash or lug your gear around. The dive staff washes, carries, and stores your gear after each day of diving. Diving in Fiji truly is a dream come true with beautiful diving and great service. In later sections of this article the diving at sites located at the various resorts will be discussed in greater detail.

## The Settlement of Fiji and the Fijian People

The Fijian people are a warm and friendly group of people who will welcome you into their hearts. As a matter of fact, the Fijian people are the friendliest and kindest people that I have encountered on my various treks around the world.

The population of Fiji is composed mostly of Fijian natives and Indians. There is also a representation of Europeans. The actual migration to and settlement of Fiji started more than 3480 years ago.

The islands were first settled in about 1600 BC by migrants from the Papua, New Guinea area. These settlers were most likely ancestors of the present day Polynesians. They practiced agriculture, raised poultry and pigs, and fished. It is

believed that a second wave of settlers may have arrived between 400 and 100 BC.

The final settlement of Fiji in approximately 1000 to 1800 AD came in the form of a massive migration from Melanesia.



Ken Loyst photo

These settlers may have numbered as high as 200,000. They practiced a sophisticated form of terraced agriculture growing yams and taro. These people also fished and raised poultry.

The Europeans first encountered Fiji during their quests for the legendary "South Land" or *terra australis incognita*. Geographers in the 16th and 17th centuries believed that there must have existed a large land mass to balance the land masses of the northern hemisphere.

The first discovery of the Fijian archipelago by Europeans was by Abel Tasman who was seeking the hoped-for "South Land" while skipping two vessels for the Dutch East India Company. On the sixth of February 1643 Tasman's expedition sighted a low island now known to have

been Nukubasaga, a sand cay located just west of Vanua Levu. Tasman also described seeing points of land that were probably the peaks of Taveuni. Tasman named his discovery the "Prince William's Islands".

The next navigator to discover Fiji was Captain James Cook. Cook's discovery was on the second of June 1774. He discovered Vatoa in the southern Lau group. This was during Cook's second expedition to the South Pacific.

The third European to arrive at Fiji was the infamous Captain Bligh. As a matter of fact, Bligh's discovery of Fiji was a direct result of the famous mutiny on the *Bounty*. On the 28th of April 1789, the crew of the *Bounty* mutinied while they were in the waters off Tonga. The crew placed Captain Bligh and 18 of his officers in one of the ship's launches with few provisions and no weapons.

It was while attempting to sail to a Dutch colony on the island of Timor more than 6000

kilometers from Tonga that Bligh and his crew passed through the Fijian Islands. At the time, Fiji was known as the Cannibal Islands and during this trip they were chased by unfriendly Fijian natives. Bligh survived his trek and actually managed to finish with a fairly accurate chart of the Fijian Islands through which he had passed.

In 1840, the largest advance in the exploration and charting of the Fijian Islands was performed by a United States expedition led by Commandant Charles Wilkes.

Prior to the arrival of European settlers and the indoctrination of the Christian religion, cannibalism was an important part of Fijian life. Cannibalism in Fiji was practiced as early as several hundred years before the birth of Christ and as late as the



1800's. It served as a religious function since the great warrior gods were cannibals and required human sacrifice. The victims were almost always enemies taken during battle. Eating your enemy was the ultimate disgrace that the victor could impose, and it served as a lasting insult in this important ancestor-based society.

The first European settlers came in the early and mid 1800's in quest of sandalwood, and later, sea cucumbers. Missionaries came in the 1830's, however, they were not readily accepted by the populace. In time, the populace was converted to Christianity. After the 1860's the settlers came primarily from Australia and New Zealand. The European population had grown to more than two thousand by 1870. Due to the inability of the native Fijians to organize a government, the British government took charge and Fiji became a Crown Colony on the tenth of October 1874.

The British Colonial government protected the Fijian people by making it illegal for them to either work on plantations or to sell their land. This was an admirable move by the colony's governor.

In 1879, the importation of Indians from Calcutta began for the purpose of indentured labor on the sugar plantations. The indentured service agreement called for five years of labor. More than 60,000 Indians were imported to serve as "coolies" on the plantations by 1916. The practice of indentured service was officially ended in 1920.

Fiji remained a British Crown Colony for ninety six years. In October 1970, Fiji became an independent country.

## Fiji's Economy

The economy of Fiji is based upon five main industries. The largest earner of hard currency for Fiji is tourism. The second largest export product is sugar. Sugar is grown on small plantations located on the islands of Viti Levu and Vanua Levu. Sugar is refined by the government



Ken Loyst photo

owned Fiji Sugar Corporation.

Other export products include gold, which is the third largest industry, followed by coconuts. Timber is gaining importance and is currently the fifth largest cash product. Most of Fijian timber is exported to Japan to make paper. Agricultural development of root crops such as taro, cassava, and yams is also showing an increased role in Fiji's economy.

## Dive Resorts

There are six dive resorts in the northern islands of Fiji. The diving at each of the different resorts is varied and each resort offers dive sites that are worth exploring. Not only is the diving different,

but each of these resorts are unique and have a different ambience. It is worthwhile to stay at more than one of these resorts during a visit to Fiji. The six dive resorts are located on four different islands. Even the different islands have unique atmospheres.

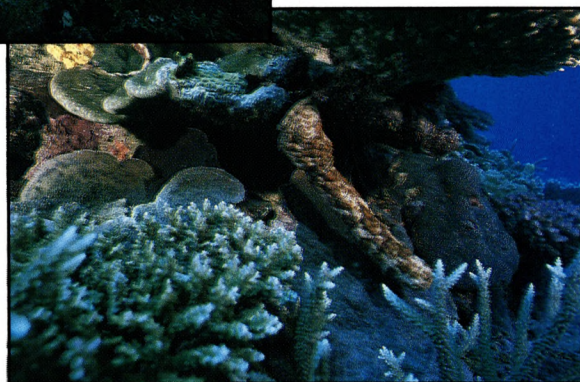
Three of the dive resorts are located on the island of Vanua Levu. Vanua Levu is the largest island in the northern group. The three resorts are Kontiki Resort, Namale Plantation, and Na Koro Resort. Dive Taveuni is located on the island of Taveuni. Both Vanua Levu and Taveuni have small towns or cities and have roads to different parts of the islands.

The remaining two resorts are nestled





Ken Loyst photo



Ken Loyst photo

on two very small islands located within ten to twenty minutes of Taveuni by boat. Matagi Island Resort is the newest resort in the northern island group and is located on the small island of Matagi. Qamea Beach resort is located on Qamea. Neither of the beautiful island paradises have any roads and all of the transportation is by boat.

The six dive resorts and a sampling of the diving offered follows. As was previously mentioned, each of the resorts are unique and have their own special qualities. A brief description of the resorts, the various activities offered, the dive facilities and a sampling of the dive sites will be given. It is hoped that this will help you to chose the destinations that best fit your particular vacation dreams.

## Kontiki Resort

The Discover Diving group stayed at Kontiki Resort their first week in Fiji. Kontiki has an atmosphere that is unique

among the other resorts located in the northern group. A stay at Kontiki is initiated with a ceremonial welcome which includes drinking kava.

The accommodations at Kontiki Resort are very nice, featuring thatched roof bures nestled amongst banana, papaya, mango, and coconut trees. The grounds are lush and well groomed, and the resort is very picturesque, with the bures arranged cozily on the grounds. The romantic looking bures built on stilts remind one of something Robinson Crusoe might have designed. The bures at Kontiki are slightly smaller than those found at most of the



Kontiki Bure

Ken Loyst photo

other resorts in the northern islands group. The accommodations are immaculately clean and neat.

There are 16 bures at Kontiki. Each bure can accommodate one to three people. This makes Kontiki one of the largest resorts in the northern islands group with a maximum capacity of 48 people. For this reason, Kontiki is one of the resorts of choice for larger dive groups.

During the Discover Diving group's stay at Kontiki there was a great deal of interaction between the group and the Fijian native employees. Before dinner there were volleyball games, and each evening ended with traditional kava drinking while sitting on the veranda listening to guitars and singing. The interaction with the natives was absolutely delightful and made the stay at Kontiki a memorable one. We were sad to leave our newly found friends. At the other resorts this interaction was either less strong or nonexistent.

Kontiki serves three excellent meals per day. The lime juice is great. One of the specialties at Kontiki is a Bula Blaster which may be obtained from the Parrot Bar and Lounge. A Bula Blaster is a mixture of fruit juices and alcohol that tastes delicious and can start even the mildest of groups on a wild and crazy night.

The diving at Kontiki is excellent and will be discussed thoroughly in the next section. There are many other things to do as well as dive. Other sporting activities include unlimited snorkeling in the shallow lagoon, tennis, volleyball with the native staff, horseback riding by arrangement, badminton, horseshoe games, and golf on a small course. All of the beaches on Fiji are a haven for shell collectors and beach combers. Water-skiing and Hobie sailing are also available but this is somewhat limited due to the shallow nature of the lagoon. There is also a fresh water swimming pool for swimming and sunning. A trip to Kontiki would not be complete without taking a hike to the waterfall nestled atop a mountain within the dense tropical forest.



## Diving at Kontiki Resort



*One of Kontiki's dive boats.*

Ken Loyst photo

Kontiki Resort hosts excellent diving. There are a variety of spots to dive and many of the spots have unique fauna and marine life. Plan to spend at least a couple of days diving at Kontiki. The dive sights range from shallow finger reefs to magnificent walls that drop to depths of over five hundred feet. There are pinnacles and sea mounts, caves and tunnels, and a variety of subsea adventures waiting to be explored.

There are three dive boats at Kontiki. Two of the boats are approximately 28 feet in length and have twin 40 horsepower engines to power them. The third boat in Kontiki's dive fleet is a sport fisher. The boats are adequate to get a diver to the dive sites which are for the most part within twenty minutes of the resort. Each boat has a covered area which affords protection from the sun and elements.

There are an infinite number of sites to dive near Kontiki. Some of the sights that we dived are described below.

Dream House Pinnacle is an excellent dive sight. The top of the pinnacle lies in forty five feet of water and edge of the pinnacle drops off to great depths. The top of the pinnacle hosts a myriad of life serving as home to colorful tropical fish, corals, and invertebrates. Along the drop-off wall there are beautiful sea fans and crynoids. Often schools of barracuda, white tipped reef sharks, and other larger fish can be seen swimming along the outer edge of the pinnacle.

Another spectacular dive sight is



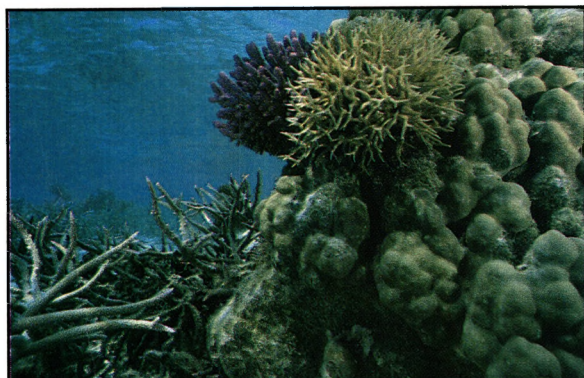
*Dive Taveuni's dive boat seen through the crystal clear waters in the Somosomo Straits.*

Ken Loyst photo

Turtle Alley. This site has the best of both worlds. The face of the site is a wall that drops off to great depths. Along the wall there are a variety of soft corals, an abundance of sea fans, and a large population of crynoids. Both turtles and white tip reef sharks are often seen at this site swimming along the wall. The top of the wall starts at about thirty feet and is as shallow as ten feet in some areas. This shallow region

hosts a diversity of hard corals, tropical fish, and crevices to swim through. This is great because it allows computer divers to maximize their time underwater following a deeper dive along the wall by frolicking in the shallows at the top of Turtle Alley. The soft corals along the wall make beautiful photographs and there are plenty of subjects to take photos of in the shallow areas.





Michael Steidley photo



Ken Loyst photo

Around the corner from Turtle Alley is another spectacular wall dive known as Lepper's Wall. The top of the wall comes to within ten feet of the surface in some areas and drops off into an abyss of unknown depth. Lepper's Wall has an incredible population of sea fans and crynoids. The most remarkable feature about Lepper's Wall is the wealth of multi-colored soft corals.

An excellent second dive is the shallow reef area directly in front of Kontiki Resort on the seaward side of the reef. This area is known as Kontiki Reef and is a beautiful site with a depth range from ten to eighty feet. Fish life abounds at this site. There is an occasional sighting of banded sea snakes at this site.

A final site to see while staying at Kontiki is Grouper Villa. This is one of the farther dive sites but it is worth the trip. The area has a large population of grouper that are fun to watch swimming about.

This site has an abundant and diverse hard coral colony and a multitude of colorful reef fish.

Between the two daily dives the dive guides break open several fresh coconuts, and offer lime juice as a remedy for diver's dry mouth.

## Namale Plantation Resort



Namale Plantation  
Bura

Michael Steidley photo

Namale Plantation Resort is also located on Vanua Levu. This secluded retreat for travellers is actually a working copra plantation with 125 acres of coconut trees located on one side of the resort and the Koro Sea on the other. This marvellous resort is a favorite place for honeymooners and people celebrating anniversaries.

The accommodations at Namale Plantation are exquisite. The thatched roof bures are located within an immaculately groomed garden setting. The bures are separated to allow privacy and each bure has its own mini-bar and small refrigerator.

Although the resort is located on eight acres of land, the resort itself has been kept small and cozy. There are only seven bures, of which three are family bures and four are designated for couples or singles. The maximum capacity at Namale Plantation is approximately twenty people.

Meals at Namale Plantation Resort are excellent featuring both Fijian and Indian cuisine. Meals may be purchased individually or in packages. The dining room is semi-formal and couples enjoy sharing experiences and stories during the meal.

There are a number of things that one can do to enjoy a stay at Namale when not diving. There is a hike to a waterfall that is lots of fun, and a delightful walk along the coastline that ends at an impressive blow hole. In addition, there are village tours, trips to the town of Savusavu, and horseback riding. For those that like sports there are tennis courts and croquet is also available. A must while staying at Namale is a tour of the coconut plantation and the gardens.

There are a variety of aquatic activities that one can partake in which include waterskiing, snorkeling along Namale Reef, sailing dingys, and windsurfing. Sunday morning brings church services, complete with beautiful native singing.





## Diving at Namale Plantation



Michael Steidley photo

*Namale Plantation's boat, Curliz No. 1, is the fastest dive boat on Vanua Levu*

The diving at Namale Plantation is excellent and is generally limited to very small groups since Namale Resort caters to individuals instead of groups. The dive operation is run by Loel Peters who does an excellent job of keeping things running in a smooth and efficient manner. Loel always puts the customer first and provides visitors with wonderful diving experiences.

Namale has the fastest dive boat on Vanua Levu. It is a V bottom aluminum boat that is powered by twin 90 horsepower engines. The boat is covered which offers protection from the elements. The boat can reach most of the dive sites within fifteen to thirty minutes because of its speed. This gives the ability to dive sites further away and yet still finish two dives before lunch. After diving, the rest of the day is left to partake in land activities.

Due to the speed of the boat, Namale has the capability to dive most of the sites described in the Kontiki Resort section. It is certainly worth the trip to dive Dream House, Turtle Alley, and Lepper's Wall for those staying at Namale. Namale also has some sites that it dives nearly exclusively.

One of the deep dives that the Namale boat frequents is Hole In The Wall. This site is an area where there is a break in the reef. They actually bring the dive boat inside the reef to moor it and then dive along the wall where the break in the reef is located. It is common to see large schools

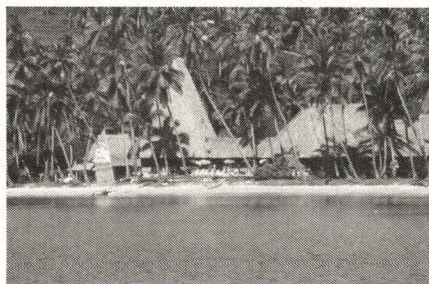
of barracuda, white tip reef sharks, and trigger fish. There are lots of overhangs along the wall and plenty of soft corals to see as well. There are a plethora of brilliantly colored reef fish darting about in the shallow areas.

There are several shallow areas in close proximity to Hole In The Wall that make excellent second dives. The areas lie just off the Savusavu airport and feature finger reefs with abundant hard corals.

## Na Koro Resort

Na Koro Resort is located on Savusavu Bay on the island of Vanua Levu. This resort is nestled between coconut trees on a beautiful white sand beach. The waters of Savusavu Bay are clear and calm and make the setting tranquil.

The thatched roof bures at Na Koro are the largest and most spacious found on Vanua Levu. These spacious bures are clean and comfortable. Each bure has a refrigerator. Na Koro Resort is part of the



Michael Steidley photo

*Na Koro Resort seen from Savusavu Bay.*

Quality Inn chain of hotels and resorts.

Na Koro has twenty bures which makes it the largest resort in the northern islands group. The resort can accommodate up to sixty five people which makes it great for larger groups. The resort tends to have a more active night life hosting various bands because of the greater number of guests that it accommodates.

The meals at Na Koro are adequate and may be purchased as a breakfast and dinner package. Lunches are purchased on an individual basis.

## Diving at Na Koro Resort

At Na Koro Resort there are a great many activities that one can participate in.



Michael Steidley photo

*Na Koro Resort's Dive boat.*

There a variety of aquatic activities which include paddle boarding, canoeing, windsurfing, and deep sea fishing. Glass bottom row boats are available and may be used for exploring the shallow reefs in front of the resort. There are several Hobie cats that are in excellent condition. In addition to these aquatic activities there are other activities that include tennis, ping pong, beach walks, sunning around the fresh water pool, and horseback riding.

Na Koro Resort does not run its own diving operation. The diving activities are run by Australian based H<sub>2</sub>O Sportz which is a separate company that specializes in underwater activities. The dive operation runs very smoothly. The vast majority of the diving is done in the bay which has a slightly different flavor than the dives that are done outside the reef.

H<sub>2</sub>O Sportz's dive boat is a large cabin cruiser called the Commander I. The Commander I is not a very fast boat so most of the sights are located fairly close to the resort. The dive boat is large and spacious and accordingly accommodates large groups very well. Most of the dive sights are between five and forty five minutes from the resort. There are occasional day trips to some of the local small islands.

H<sub>2</sub>O Sportz occasionally takes groups to the previously mentioned Hole In The Wall dive site. The ride to this site takes approximately forty-five minutes.



# Fiji

## Kava

by Jolee Brunton

Some of the most enjoyable moments at Kontiki were spent sitting cross-legged on a grass mat, sharing a bilo (coconut shell cup) of dishwater-colored kava with warm, funny, delightful Fijians. Kava, or yaqona, is as much a part of Fijian life as the ocean and the jungle. On the first evening of our stay at Kontiki we were invited to participate in a kava ceremony given to welcome us to the island. We gathered in a large circle on the veranda and watched as Sam solemnly prepared the drink. He took the pulverized root of a plant related to the pepper tree, placed it in a cloth sack, and mixed it by hand in a large wooden bowl full of water, called a tanoa. He then dipped a bilo into the muddy liquid and offered it to the leader of the group, Ken Loyst. Another Fijian explained that before accepting the bilo, Ken must first clap his hands twice as a symbol of respect to his host. Ken then took the bilo and drank, as Sam clapped his hands three times to rid Ken of any bad spirits



that might have hitched a ride from California to Fiji. When Ken had drained the cup, Sam clapped two more times to welcome and honor Ken. Sam returned to the bowl, filled the bilo, and repeated the clapping and drinking with each of the group.

When all the visitors had been properly initiated, the Fijians each had a bowl.

Kava tastes, well, unusual. It has a tingly, slightly numbing effect on the tongue, which is not unpleasant, but takes some getting used to. Some likened the

There is a reef within five minutes ride from Na Koro called Nugget Reef that makes an excellent shallow second dive. The depth range is approximately fifteen to fifty feet. The coral head is covered with orange fairy basslets. There are numerous yellow soft corals at this site and lionfish are commonly encountered.

Mystery Reef, also called Alice In Wonderland, has a number of large mushroom shaped bommies or coral heads. These unique mushroom shaped bommies are covered with pink, yellow, and white soft corals that make this site popular amongst photographers.

A final treat that a diver can explore is Split Rock located in Savusavu Bay. This site is located almost directly in front of Na Koro Resort. Split Rock is a little underwater garden that features a house sized rock with a split that runs through the center. In the split is an incredible collection of brilliantly colored soft corals that will delight any photographer. The site may be either scuba or free dived.

Some of the other commonly dived sites include Shark Alley, Queens Hole, Fingers, and the previously described Split Rock.

## Dive Taveuni



Dive Taveuni Bure

Ken Loyst photo

Taveuni island is a forty-five minute plane trip from the Suva airport on Vanua Levu. Dive Taveuni Resort is just minutes away (about a mile) from the landing strip



## ("Try a cup?")



some getting used to. Some likened the taste to a muddy ginseng tea. Kava is non-alcoholic, but some reported a mild euphoria, and everyone easily recognized its diurectic effects.

The most significant effect of kava is

interaction. Sitting around the bowl at night we had opportunity to listen to the Fijians play guitar, sing and converse, as well as joining in the activities ourselves. A spirited song would initiate dancing Fiji style-men and women side-by-side with

arms around each others' waists, rhythmically strolling back and forth. After the first evening, kava drinking became much less formal. Clapping continued, as did passing the bilo, but with less ritual. As Rob Kay writes in *Fiji: A travel survival kit*, "Most importantly, the act of sharing a bowl creates an invisible bond between the participants. The visitor feels a warmth and acceptance among complete strangers that is normally associated with family or close friends. It is no accident that in Fiji many business contracts are consummated around a kava bowl."

The warmth and acceptance generated by the evenings on the veranda added a dimension to our Fiji trip that none of us expected, and all will cherish. If you go to Fiji and are asked "E dua na bilo?", do yourself a favor. Put aside your Western disdain for drinking after someone else, don't wrinkle your nose in disgust at the murky brown fluid. Clap your hands twice and drink in the magic of Fiji.

at Taveuni airport by taxi.

The resort is situated on five acres of incredibly beautiful property that overlooks the Somosomo Strait. From the porch of the dining room one can look across the strait and see Vanua Levu. There are five modern bures that can accommodate a total of 12 people. All of the rooms have refrigerators. Each room also has a king size bed that may be split into twin beds.

The hospitality of Ric and Do Cammick, owners and operators of the resort, is wonderful. The meals are selected from a combination of European and Fijian cuisine. Dinner is excellent while breakfast is adequate. Lunch consists of soup that is

served on the dive boat between dives.

There are two spectacular waterfalls that may be visited during your stay at Diva Taveuni. One of the falls, called Bouma Falls after the local village, is a short five minute walk from the road (or more accurately the dirt road) and may be visited following a day's diving activities. There is a \$2.00 (Fijian) fee per person to the village, and it is worth it.

The other waterfall is an all day excursion that takes about two and a half hours to hike in each direction. Don't let this long hike discourage you, most of it is along the beach. The trip is a scenic adventure.

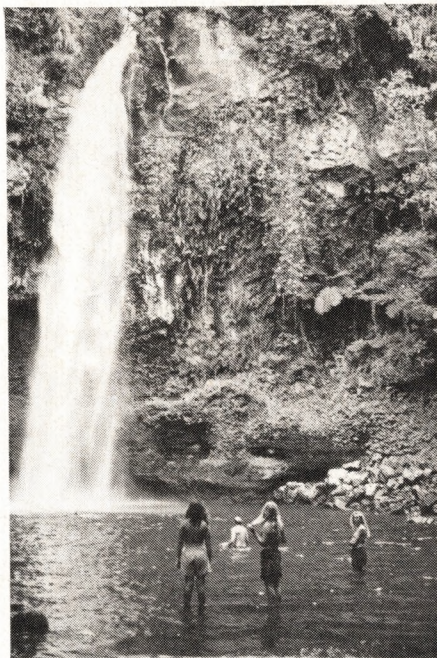


*A secluded Fijian village on the way to the waterfall*

Ken Loyst photo

The hike begins at a Fijian village, named Levena, where you meet the chief and honor him with a packet of kava to pass through the village. Bring along





**Bouma Waterfall**

Ken Loyst photo

M&M's, hard candy, or a Polaroid camera and you'll have friends for life.

After passing through the village, the hike follows the beautiful coast line, passes

by a primitive Fijian village, and then cuts inland along a river. Along the river there is a rough trail to follow. The hike is well worth the effort when you finally see the waterfall. It is at the end of a long narrow rock valley. The only way to get to the actual fall is to swim through this narrow rock valley. As you near the end, the valley opens up to reveal two spectacular waterfalls. One of the falls sends a rock slide that turns adults into little kids as they are whoosed down into the deep pool below. The high rock ledges around the pool where the two falls empty are perfect for the adventurous souls that like to practice the art of high diving.

## Diving the Somosomo Strait

The diving activities at Dive Taveuni take place in the Somosomo Strait that lies between the islands of Taveuni and Vanua Levu. The diving in the strait is awesome. Marine life and soft corals abound in the nutrient rich currents that pass through the strait. All of the diving is done from an

anchored boat. The currents can move fast and strong at times and accordingly divers should be experienced and comfortable under these more challenging diving conditions.

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**The Somosomo Strait contains the White Wall .... one of the most awe inspiring dives in the world .... A diver swimming horizontally along the wall will become lost in the endless garden of white soft coral**

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Dive Taveuni's boat is a large 38 foot aluminum-hulled catamaran that serves as an excellent dive boat. This is without a doubt one of the nicest dive vessels in the Northern Group. The boat is spacious and comfortable which makes the time spent on the boat comfortable even for larger groups of up to twelve people. Ric is a master at his trade, and the operation is flawless.

Divers depart from the resort in taxis each morning. The ride to the boat is scenic along the coast and takes about twenty minutes. Most of the dive sites are less than forty five minutes away from the dock.

A deeper dive is usually made followed by lunch in one of the small picturesque bays located on the tip of Vanua Levu. After finishing the excellent soup lunch there is time for either skin diving in the bay or beach combing. There are lots of shells to be found along the beach but it is asked that no shells with living animals be taken. The shelling is wonderful. A lucky beach comber may even find a rare treasure — a nautilus shell.



*Some of the Discover Diving group relaxes on the spacious foredeck of Dive Taveuni's dive boat.*

Ken Loyst photo



The second dive follows lunch and is usually on a shallower reef. The return trip allows time for a short bit of sun bathing and relaxing. The diving adventures are normally ended by three o'clock,

The Somosomo Strait contains the White Wall which is one of the most awe inspiring dives in the world. Discovered by Ric, the wall starts at a vertical tunnel that drops down to about ninety feet and then opens on the face wall that plunges to depths over 200 feet. A diver swimming horizontally along the wall will become lost in the endless garden of white soft coral. The beauty is breath taking. Even with a wide angle lens it is not possible to capture the awesomeness of the White Wall. This dive must be experienced.... it will move to the top of any diver's list as one of the greatest dives. The dive finishes at another tunnel that returns to the top of the reef. In the shallows at the top of the reef, the remaining part of the dive may be spent frolicking amongst the colorful reef fish darting about in the current.

There are numerous other dive sites that each have their own special appeal. Cabbage Patch is an excellent site. There

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### **Even with a wide angle lens it is not possible to capture the beauty of the White Wall**

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are patches of large green coral that look like huge cabbages. The site is frequented by big jacks, turtles, white tip reef sharks, angels, and a plethora of smaller reef fish.

Annie's Bommies is another site that has three massive coral heads which form a triangle. Bommie is the term used for large coral heads. This site has a variety of soft corals that flourish in the strong currents that frequently sweep through this site. Annie's Bommies also has a variety of clownfish species that live in the various coral heads.



Michael Steidley photo

### **Matagi Island Resort**

Matagi Island Resort is the newest resort in the northern islands group. Matagi is a little island that lies a short distance by boat from the island of Taveuni. The boat ride takes fifteen to twenty minutes in a fast boat. The island is owned by the Douglas family who also own and operate the resort.

The accommodations at Matagi Island Resort are splendid. There are ten large circular bures with thatched roofs that are spacious and luxurious inside. These circular bures are of Polynesian influence, unlike the square or rectangular bures of Melanesian influence that are most common in Fiji. Matagi Island Resort caters to both groups and individuals.





**Matagi Resort Bure**

Michael Steidley photo

Each day there are fruit and snacks placed in the bures to accompany afternoon tea.

The cuisine is excellent with generous portions provided. Meals may be purchased in a daily package. Special diet considerations are gladly accommodated with advance notice.

There are a variety of aquatic activities to keep a person busy when they are not diving. Waterskiing, windsurfing, Hobie cat sailing, and snorkeling are readily available directly in front of the resort. There is also a volcano crater lagoon on the island that has some excellent snorkeling. The resort will shuttle one couple at a time to the lagoon for a romantic day of snorkeling and lunch. Fly fishing and light tackle fishing are also available.

There are a variety of nonaquatic activities that are available. There are tours villages and mekes (ceremonial dances) that are all-day affairs which require travel to Qamea or Taveuni. Hiking along the mountain ridge on Matagi is also a delightful way to pass several hours.

The head of the diving operation is Nigel Douglas, an instructor. Carol Kurop another instructor, also serves as a dive-master and tour guide. The dive boat is a forty-two foot cruiser called the Lady Christine. There is plenty of room to stretch out and relax on the boat while slowly cruising to the dive site. A deeper dive is done each morning followed by lunch at the resort. The afternoon dive follows lunch.

There are excellent dive sites near the island of Matagi. Most of the diving is less than an hour away on the Lady Christine. There are even a couple of dive sites that are directly in front of the resort and accessible from the beach for either that third dive of the day or a night dive.



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One of Matagi's excellent deeper dives is Noel's Wall located at Motui Levu. This sight has magnificent drop offs and large of sea fans. A variety of sharks are often seen at this sight.

The Purple Wall is a must see dive site while visiting the northern islands group. This site lies between the islands of Qamea and Taveuni. The site is visited by groups from both Matagi Island Resort and Qamea Beach Club. The wall drops off to a depth of one hundred feet, and, like its name implies, hosts a myriad of purple colored soft corals. When the current is moving rapidly the soft coral feathers out and feeds, which makes the dive very beautiful. Although the Purple Wall is not quite as spectacular as the White Wall in the Somosomo Strait, it is still a very worthwhile to dive.

Another enjoyable dive site is Flora's Flower Garden located on the east side of Matagi. This site features an abundance of soft and hard corals and a bountiful fish population. Giant clams may also be found at this site.

## Qamea Beach Club



*Qamea Bure*

Michael Steidley photo

Qamea Beach Club is a beautiful resort nestled along a white sand beach amongst coconut trees. This get-away caters to couples looking for a romantic atmosphere. Jo Kloss is a one of the owners. With her vivacious personality she keeps things lively at the resort. Qamea specializes in servicing couples or singles and will not take bookings from groups.

The bures are large and spacious with excellent furnishings. Each unit has a refrigerator.

There is plenty to do at Qamea Beach Club for divers and nondivers alike. Jo hosts frequent beach barbecues with fresh fish, pork, and poultry. There are sailing dingys and Hobie cats available, and lots of desolate beaches for those romantic evening walks. There is a beautiful reef in shallow water directly in front of the resort's white sand beach. Hours can be spent at this reef snorkeling and sightseeing. There are frequent mekes and a live band that keeps the evenings lively. This is a beautiful location for people on their honeymoon.

## Diving Qamea Beach Club

The dive operation is run by Bob Bowdy and Judy Beatty who formerly ran the live-aboard dive vessel *Little Cayman Diver*. Reservations are limited to eight divers at a time. The dive boat at Qamea, called Tilo, is a thirty five feet diesel engine single screw boat.

## Fijian Language

### Fijian Pronunciation

There are some special pronunciations to be aware of when trying to pronounce Fijian words. Most of these are in consonant letters. The consonant letters that are unusual to the English language are:

- b** pronounced as mb, as in member
- d** pronounced as nd, as in Monday
- q** pronounced as ng +g as in finger
- g** pronounced as ng, as in singer
- c** pronounced as th, as in father

That is why the airport where your international flight arrived is written as Nadi and pronounced as Nandi, or the greeting of Bula is pronounced Mboolah.

### Fijian Words to Know

There are some common Fijian words and phrases that are useful when traveling in Fiji, they are listed below.

**Bula** (Mboo-lah) is a common greeting. It literally means 'health', or 'life'. This is the most commonly used greeting.

**Ni Bula** (Ni-Mboo-lah) is a polite, more formal greeting

**Moce** (mo-thay) It literally means 'sleep' but also means 'good-bye' or 'good night'.

**Vinika** (Vee-NAH-kah) means 'good' and 'thank you'.

**Vinaka Vaka Levu** (Vee-NAH-kah vaka lay-vu) means 'thank you very much'.

**io** (ee-oh) means 'yes'.

**sega** (sayngah) means 'no'.

**lavo** (lah-vo) means 'money'.

**bure** (bur-ay) means 'sleeping house'.

**bia** (bee-ah) means 'beer'.

**levu** (layvu) means 'big' or 'many'.

**kana** (kahna) means 'eat'.

**bilo** (bee-low) means 'cup'.

**yaqona** (yang-go-nah) Means 'kava'.

**tanoa** (tah-noah) means 'kava bowl'.

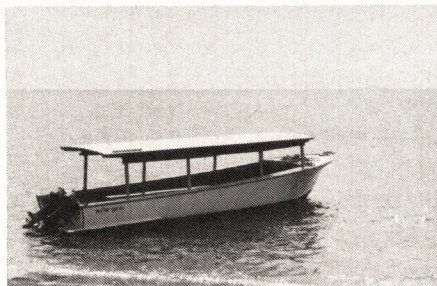
**tagane** (tahng-ahnay) means 'man'.

**yaleva** (yah-lay-wah) means 'woman'.

**vaka malua** (vaka-mahluah) means 'go slowly', 'take your time'.

**Bommies** are mountain shaped coral heads.





*Qamea dive boat*

Michael Steidley photo

There are several dive sites that Qamea visits. Less than ten minutes from the resort by boat is Varanu. This dive site is a current drift dive where the boat follows the divers and picks them up at the end of the dive. Varanu has plenty to see in the shallow depths and reaches a maximum depth of about a hundred feet. There is the

normal abundance of both hard and soft corals at this site as well as a dynamic fish population. There are an astounding number of orange and purple fish that hide amongst the staghorn coral. Lionfish and giant clams may also be seen at Varanu.

The Caves dive site is a delightful site for both divers and snorkelers. The site is about twenty minutes from Qamea and features a series of small caves and tunnels that are in ten to thirty feet of water. There are areas where a diver can go deep, however, this site is an incredible place to spend exploring in depths less than fifty feet. The Caves has an outstanding diversity of hard corals and an incredible population of colorful reef fish. There are several varieties of clownfish that may be seen at this site. It was also fascinating to find numerous small

abalone shells reaching lengths up to two inches at the Caves.

Although there are a diverse variety of resorts and dive sites in the northern island group of Fiji, any destination that is chosen for a diving vacation will certainly be a winner. Enjoy this enchanted group of islands in the South Pacific where the diving is warm and beautiful. Spread your vacation out over several resorts and sites so that you can enjoy all of the beauty that this special part of the diving world has to offer.

**Editor's Thanks:** *Discover Diving* would like to thank Tropical Adventures Travel, for making such precise arrangements for our Fiji group, and all of the friendly people in Fiji who helped make our stay a pleasant and memorable one.

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# The Sherwood Genesis Buoyancy Compensator

by Michael Steidley  
Photography by Karren  
House and Michael Steidley

Sherwood has introduced a new buoyancy compensator this year that is loaded with features and looks sharp. I recently spent a week diving with the Genesis BCD during a trip through Belize, the Bay Islands of Honduras, and Cozumel on board the M/V Ocean Spirit. During fourteen dives made while on this trip, the Genesis buoyancy compensator performed very well.

One of the first features that a diver notices when holding the Genesis buoyancy compensator is that it has a "soft pack". In other words, there is no rigid back pack system. For divers that travel, this is a tremendous benefit since the system takes up a smaller amount of room inside the gear bag than a conventional buoyancy compensator with a hard pack. The Sherwood Genesis buoyancy compensator soft pack system has incorporated many slick features that make this BC unique.

The scuba cylinder is held in place by a dual strap system. Each strap has its own tensioner or buckle which allows a diver to

tighten both bands firmly into place. Using two bands in this manner allows for a more complete integration of the cylinder and



buoyancy compensator. This provides stability and rigidity once the system is assembled together and helps to prevent the cylinder from swaying back and forth while underwater.

The soft pack system also contains an anatomically designed pad that fits into and against the lower back area to provide support. This lumbar pad serves several purposes. It fills the cavity that is ordinarily formed between a diver's pack and back. This helps to prevent tank roll. The pad which is made of a soft cushiony material also makes the buoyancy compensator very comfortable to wear in tropical water even without a wet suit.

The lumbar pad is fabricated from a porous material that absorbs water as a diver enters the water. This makes the pad neutrally buoyant. Many buoyancy compensators that have padding are positively buoyant even when they are completely empty of air.

This inherent positive buoyancy in turn causes divers to wear more weight. The problem has been eliminated in the Gene-



sis buoyancy compensator by the use of the water absorbant porous pad.

Another nice feature incorporated into the soft pack system is the depth compensating cummerbund. The cummerbund should be cinched snugly around the body prior to the dive. Throughout the course of a dive, the cummerbund will stretch and contract keeping the buoyancy compensator snug at all times. This also helps to prevent the cylinder from rolling around during the dive.

A final and unique feature that Sherwood has incorporated into the system is the elastic upper chest strap. The buckle is hooked with a simple quick release system. When the BCD is empty the elastic strap keeps the lobes close to the body which helps to reduce drag while swimming through the water. On the other hand, the elastic material allows the buoyancy compensator to expand away from a diver's body as it is inflated which helps to prevent the system from squeezing the diver's upper body.

The Sherwood Genesis buoyancy compensator utilizes single bladder construction technology. Single bladder buoyancy compensators tend to have less drag in the water due to a lower profile than double bladder buoyancy compensators. In addition, the single bladder BC's tend to be more durable than the double bladder systems.

The bladders on the Genesis BC also have a large air capacity which can provide

extra buoyancy for divers.

All of the Sherwood buoyancy



compensators come with an easy to use balanced power inflator. The quick dump valve attached to the left shoulder makes buoyancy adjustment a breeze. A simple tug on the power inflator hose readily vents air from the buoyancy compensator. The quick dump system works best when the diver is in a vertical position although it functioned surprisingly well in a horizontal position with the torso elevated only slightly.

For the fashion and color conscious diver the Genesis system can fulfill those needs as well. The shoulder pads and pockets are interchangeable and come in a variety of colors. This makes changing the look of the buoyancy compensator to match different diving outfits both easy and affordable.

The Genesis buoyancy compensator looks sharp and is comfortable. This well designed buoyancy compensator should provide any diver with years of comfortable, efficient buoyancy compensation. The soft pack system is certainly the trend of the future.

The combination of a high-tech Genesis scuba cylinder and the new Genesis buoyancy compensator will bring any diver to the leading edge of diving equipment technology.

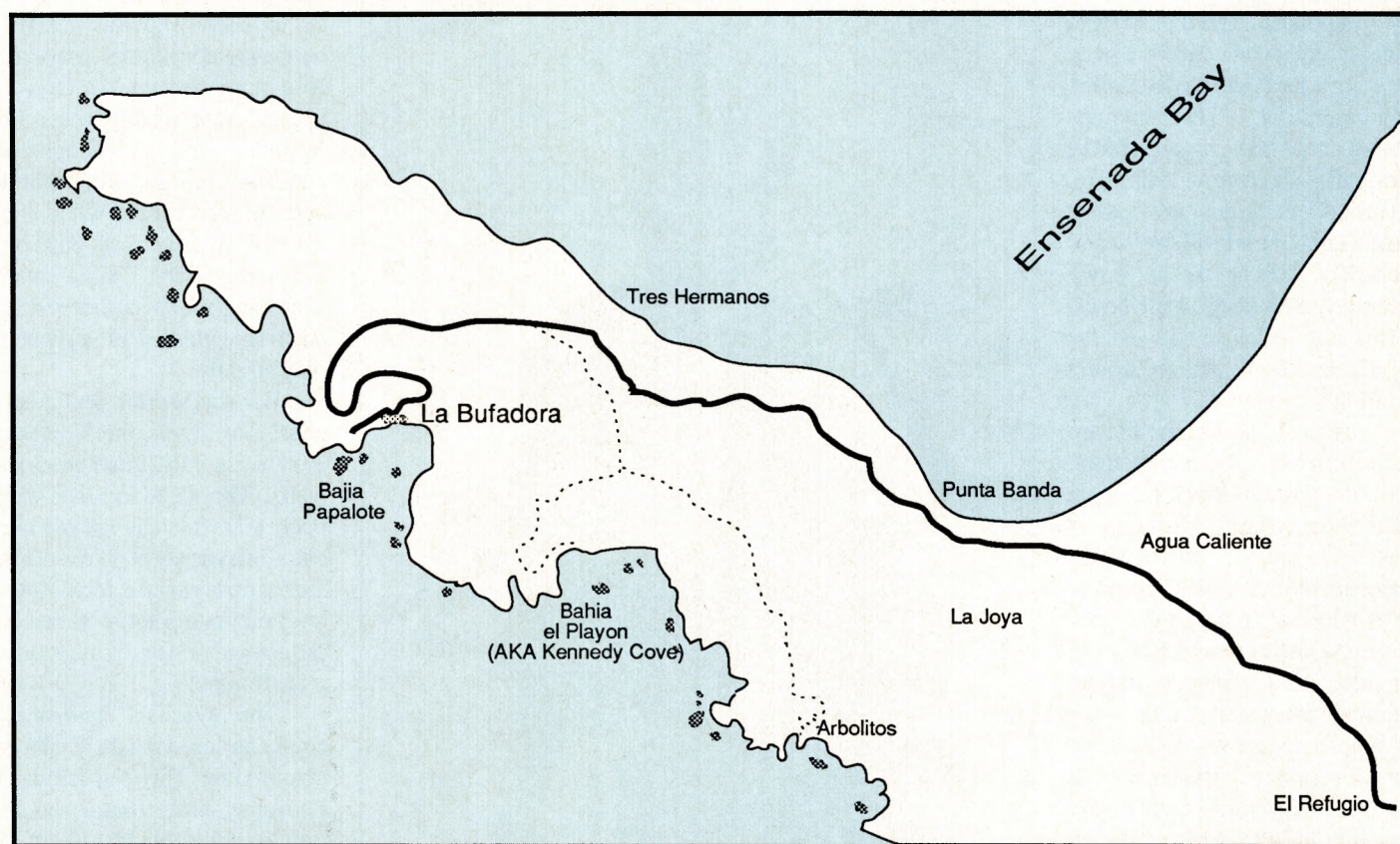
For more information about the genesis buoyancy compensator contact your authorized

Sherwood dealer.



# BAJA CALIFORNIA'S BLOW HOLE

## LA BUFADORA



**by Michael Steidley**

La Bufadora (which means the blow hole in Spanish) is a beautiful dive destination located just south of Ensenada in an area known as Punta Banda. The total driving distance from the Mexican border to La Bufadora is only 94.2 miles. Leaving from San Diego, La Bufadora is a pleasant day long excursion. For those that want to spend more than just a day exploring the undersea realm around La Bufadora there

are primitive camping facilities, a couple of small restaurants, and even a small dive shop where you can have your tanks filled.

The drive to La Bufadora is very scenic and a worthwhile trip for both divers and non-divers alike. Crossing the Mexican border at Tijuana, one simply follows the signs to Ensenada. This will put you on Mexican Highway 1, which is a toll road. Highway 1 is a divided four lane highway. This highway is easier to drive on and is also much safer than the older undivided

free highway. On the toll highway, there are three toll stations between Tijuana and Ensenada. There are no toll stations south of Ensenada. The distances from the border to each toll station and the amount of the toll at the time of writing are listed below:

Distance	Station	Toll Fee
6.8 mi.	#1	\$0.60
22.9 mi.	#2	\$0.90
62.8 mi.	#3	\$0.90





Michael Steidley photo

*The Blow Hole at La Bufadora sprays water skyward with the onset of an ocean swell.*

The speed limit along most of the highway is 110 kilometers per hour which is approximately 68 miles per hour. If you take the Ensenada Centro exit you will drive along the bay. There are several signs indicating the direction to La Bufadora that will help keep you on course. Leaving Ensenada and heading south, your next reference will be a small town called Maneadero. As you pass through Maneadero the road will fork and following the right hand fork will lead you to La

Bufadora. The turn off is marked by a sign and if you've been keeping track of your mileage this turn off is exactly 81 miles from the Mexican-US Border. You have almost completed your trek since there are only 13.2 more miles to go until you arrive at the village of La Bufadora. The drive along Punta Banda is scenic. The Punta Banda area is characterized by steep cliffs, blue water and off shore kelp beds.

The Blow Hole is certainly something you will want to take time to see before

you go diving. La Bufadora or the Blow Hole is a natural phenomenon. The Blow Hole consists of a large underwater crevice through which the ocean swell forces water. There is a tremendous amount of energy forcing the water through the crevice and this force can cause the water to be sprayed upward as much as 100 feet into the air. Because of the tremendous energy that can be generated in this area you should not dive in close proximity of the Blow Hole.





*The wash  
rocks and  
general dive  
area at La  
Bufadora*

Michael Steidley photo

The diving in the La Bufadora/Punta Banda area has a little bit to offer to every diver. The entries range from easy beach entries to some rather challenging rock entries depending upon where you are in

the bay. There is a beautiful kelp bed that supports a large marine population. The marine life one can expect to see is similar to that found in many Southern California locations. There is an abundance of gar-

ibaldi, sheephead, bass, blacksmiths, and gobies. It is also common to find little hornsharks laying on the bottom.

It is interesting to note that Punta Banda sticks out and catches a cold southward current from the north. These cooler waters occasionally bring in marine life typical of central and northern California. The bottom terrain ranges from sandy to areas that have large boulders, crevices, and rock overhangs. There are also some areas that have steep drop-offs and sheer rock walls that can drop to depths of 100 feet. During the whale season, it is common to see gray whales swimming along the coast at the mouth of the bay. Sea lions are also frequently seen at La Bufadora.

One of the popular areas to dive is the underwater arch and wall area. The entry place commonly used is in the center area of the photograph above. After a careful climb down the cliff, the water entry is

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fairly simple. On calm days, one can jump off the rocky staging area and be in 10-15 feet of water. The underwater arch and wall area is an easy 100 to 200 yard surface swim away. This area is easily identified by several large rocks that stick out above the water level. Descending on the northern edge of the rocks and working along the edge around to the west side of the rocks you will pass by the underwater arch and end up on a steep wall that drops down to 100 feet. The top part of the wall levels off in some areas at 30 feet and there is an abundance of kelp and marine life. On calm days, a great deal of fun can be had exploring these shallow nooks and crannies. The deeper part of the wall also has a thriving marine population. The sheer magnitude of the wall can be overwhelming. Remember to watch both your depth and bottom time carefully on this dive.

After a hard day of diving and sun, an enjoyable way to top off the day is with a lobster dinner on the way back to the U.S. Puerto Nuevo is a small village 60 miles north of La Bufadora that has become synonymous with lobster dinner. One of the most popular restaurants is Ortega's, but there are at least half a dozen other places that specialize in serving lobster. At the time of this writing a hearty lobster dinner costs about \$14.00. Finding Puerto Nuevo on the way back to the U.S. from La Bufadora is a little tricky. The exit is not well marked and missing it will result in a long drive before being able to turn around to come back. Heading north from La Bufadora, the exit is exactly 60.4 miles provided the Ensenada Centro route was taken on the return trip. The name of this exit is Cantamar. After you get off at the exit, take a right turn and head north 1.3 miles. Look west and make a left turn to end up in the middle of Puerto Nuevo.

La Bufadora offers a diversity of exciting dive spots that will take several trips to explore. A day of diving this area followed by a lobster dinner is a experience that is worth repeating.

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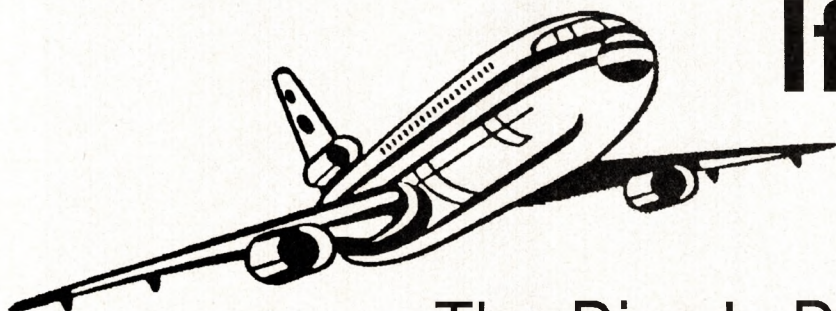


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# If You Fly...

## The Diver's Dilemma

### Part II

By Michael N. Emmerman

In Part I of this series, I gave an overview of the problems relating to dehydration and "blood sludging". Also covered, was the relationship between "blood sludging" and the disruption of the normal gas exchange process. These are critical factors affecting all commercial aircraft travelers — especially divers. In this part of the series I will review many of the subtle changes that your body encounters while being exposed to the aircraft cabin environment. You should be aware of these subtle changes so that you will be better

prepared to make rational decisions about your diving profiles before and after traveling the "friendly" skies.

### Circulatory Stress

By Holter monitoring aircraft passengers during flights, it was determined that normal passengers may experience some discomfort and may actually experience circulatory stress (the human body working harder to process and use the lower oxygen supply available at normal aircraft

cruising altitudes). Some of the signs and symptoms of this discomfort are: hyperventilation, air hunger, headaches, dizziness, fatigue, hot and cold flashes, nausea, tingling sensations, numbness, and belligerence. Let's imagine that you have been diving for the past few days and are now sitting in an aircraft cruising at 30,000 feet. You start to experience some of these symptoms. Are you suffering from circulatory stress (hypoxia) or decompression sickness (DCS)? Good question! If your last dive was 39 hours ago, it is more likely to be circulatory stress (the majority of DCS cases that present in aircraft are within 24 hours of the last dive). If your last dive was 8 hours ago, I would be more seriously concerned.

### Subtle Incapacitation

Flight crews describe period of "subtle incapacitation" as numbness in an arm or leg, pain in an area of the body, or just falling asleep (while otherwise not feeling fatigued). This appears to be more of a problem for flight crew members who have been injured in an accident or "bumped" around a lot (as in sports injuries). For divers, numbness or pain can scare the hell out of you — as well it should. If any of these problems bothered me, I would seek the opinion of a medical authority who is qualified in diving medicine. Don't deny that these signs or symptoms exist (if they do) — seek help, no matter how long it has been since your last dive!

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## Ozone

You should be aware of two types of ozone — surface ozone and high altitude ozone. Surface ozone can be encountered in areas of dense automobile exhaust fumes. High altitude ozone can be encountered by aircraft cruising above about 35,000 feet. The signs and symptoms of ozone exposure can include: decrements in pulmonary function, cough, upper airway irritation, tickle in the throat, chest discomfort, substantial pain or soreness, difficulty or pain in taking a deep breath, shortness of breath, wheezing, headache, fatigue, nasal congestion, and eye irritation. These symptoms and the alteration in pulmonary function usually disappear within two to four hours after the termination of the exposure. Some people have reported persistence of these symptoms for periods in excess of 24 hours. Now, picture yourself rushing to make your first dive after flying in to your dive paradise while still experiencing some of these problems. Even worse, think about experiencing these symptoms on the trip home after diving! Am I suffering from decompression sickness, hypoxia, ozone exposure of something else? Odds are that there will be no one on the aircraft to help you figure out the answer. Good reason to wait a solid 24 hours after diving.

## Vision and Hearing

The amount of light needed for a flight crew member to see his surrounding must be increased about 25 percent above normal at 5,000 feet, and 60 percent at 10,000 feet. Have you ever found it difficult to read or do close figure work on an aircraft at night? The only thing you can do about this problem is to bring your dive light with you (to provide extra light) or stop reading.

Corneal ulcerations have been reported in wearers of contact lenses after long flights, possibly owing to low oxygen partial pressure, as well as low relative humidity. It is recommended that you remove contact lenses on long flights or wear lenses specially designed for use in dry air. People wearing soft contact lenses generally have more eye irritation symp-

toms that result from low humidity.

On the subject of hearing, one research study reported that "the normal rates of change of cabin pressure do not pose a problem for passengers in normal health. However, persons suffering from upper respiratory infections might experience pain of varied severity, temporary loss of hearing, and tinnitus..." Sound familiar? Remember being told, "Don't dive with an upper respiratory infection". Have you ever heard a warning on not flying with the same malady? This is obviously not normally a serious problem. But, it is amazing that so many divers seem to have problems understanding why they may have unusual difficulty equalizing in an aircraft. What is even more amazing, is that these same divers then wonder why they have difficulty equalizing on the first few dives after the flight. Take the hint. If you are having an equalization problem on the air-

craft, the odds favor you having the same problem during a dive. You may have paid a couple of thousand dollars for this dive trip, but you only have two ears! Wait until you feel ready to dive.


## Irritability After Long Flights

Some of us will travel for 10 to 30 hours to get to certain far away dive locations — Papua New Guinea, Fiji, the Red Sea, etc. The experiences of long range flight crews after such trips can be of great help to us in understanding the effects of extended travel. Whenever I have discussed the question of "irritability" with long range flight crew members, the response has almost always been universal. For the first 12 to 18 hours after very long flights, most crew members feel lethargic and unable to perform an exercise program at peak levels. For the next 12 to 18 hour period, these same crew members com-


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## Diving Trends

plain of being intolerant of others (or "difficult to be near"). These complaints, by the way, are very similar to the complaints of commercial and saturation divers after long hyperbaric exposures. In addition to the problem of irritability, many long range flight crew personnel complain that after these long exposures they have difficulty working with numbers. For some of these flight crew member, it usually takes up to three days (post-flight) to feel "normal" again. So, here you are, Joe (or Josephine) diver, having spent the last 27 hours travelling to the Upja Waja dive resort. You

are not exactly operating on all cylinders and you may even find it difficult to focus on those small numbers on your dive table (or, more likely, on those dive computer screens). You may have two ears, but you only have one life! Wait until you feel 100%.

### Serious Stuff

All of this information is a lot to digest at one time. Go back and read Part I of this series and then read this installment again. The message should be clear. Divers and non-divers alike have a great deal to con-

sider when traveling aboard a commercial aircraft. Much more research is needed to find the solutions to many of these problems. One thing, however, is obvious. All of us who place our lives on the line by putting a tank on our backs must be operating at 100% efficiency whenever we enter the water. Consider your state of health carefully after you fly and before you dive. And, maybe even more importantly, if you must fly after diving, consider doing more conservative dive profiles and making a longer surface interval before entering the aircraft cabin.

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# FILM , SHUTTER, & APERTURE

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by Al Bruton

The relationship between film speed, shutter speed and aperture (f stops) is no different in underwater photography than it is in land photography. However, the actual application is restricted in the underwater setting, due to low ambient light conditions, so let's take a look at these relationships.

The objective in photography is to obtain a proper exposure by controlling the amount of light reaching the film. There are three ways you can achieve proper exposure.

## Film Speed

All films have ratings as ASA, or ISO that provide the user a guide to the film's speed. These rating numbers are in a sequential order, with each higher number being twice as fast as the number below it. These ratings are generally 25, 50, 100, 200, or 400. Therefore, a film with an ASA rating of 100 is twice as fast as a film rated at 50. It will achieve the same light absorbancy as the ASA 50 film in one half the exposure time. Fast films are usually ASA 400 and higher and are used for action photography when you need to stop action, but these films often require high shutter speeds and require long lenses thus you have difficulty obtaining sufficient light.

In underwater photography high speed (fast) films are usually not the preferred choice of photographers, due to the high grain texture found with these films and the low contrast found underwater. The colors of the underwater world are much more vibrant with slower films in the ASA 25 to 100 range, with ASA 100 the most favored by underwater photographers. High speed/grain films generally do not look good in open water shots, but there are ex-

ceptions in certain shooting situations. High speed black & white films are excellent for mood when shooting in deep water, with low ambient light, especially around wrecks and vertical walls in medium and wide angle photography. High speed color print (negative) films and E-6 slide (transparency) films can be shot in light levels that are very low, if you do not mind the grain, but it is much more evident than in black & white films. High speed films are getting much better in reduction of grain. Recent tests with the new Agfa 1000 RS 1000 (E-6 slide) showed grain structure comparable to an ASA 200 speed film. It is a good idea to experiment with some of these films once you have the basics down and form your own opinions.

Each increase or decrease in film speed is the equivalent of a one stop opening or closing of the camera lens (called aperture or f stop). We will discuss this in greater depth later.

## Shutter speed

In underwater strobe photography with the Nikonos camera you have a very limited number of shutter speeds that will sync (work with) your strobes. These choices are a 30th, 60th or 90th of a second, dependent on the specific Nikonos camera. Some of the new housed SLR cameras offer additional choices, up to a 250th of a second. In a future article I will discuss housed camera systems. With the exception of a 90th of a second (1/2 stop) each increase/decrease in shutter speed is also equivalent to a one stop increase/decrease in the lens aperture (f stop), or a doubling effect. The higher the number the faster the shutter opens and closes. Thus, a 60th of a second shutter speed is twice as fast as a 30th of a second, or a 30th of a second allows twice as much light in as a 60th of a second.

## Lens Aperture (f stops)

Most underwater lenses will have a range of f 2.8 to f 22. The lower the number the more light that is allowed to pass through the lens. Thus, as you close the lens (go to a higher number) you reduce the lens iris opening and restrict the amount of light reaching the film. We again find the same doubling factor we saw in film speed and shutter speed. That is, f 5.6 allows in half the amount of light that f 4 permitted, f 8 half of f 5.6, etc. f 2.8 lets in twice the light of f 4 and f 4 twice as much as f 5.6. Each increase/decrease in the lens opening is called a "stop", thus the term "f stops". Higher f stop numbers also result in an increase in depth of field, or distance that the photograph will be in focus.

## Medium to Wide Angle Shots

Now let us put all of this to some practical application in underwater photography, specific to the Nikonos camera system. In underwater photography it is easier to start with three basic types of shots.

The first of these is medium to wide angle shots of divers and marine life in relation to their environment. In these shots it becomes very important to match your strobe light with the available ambient light to achieve a balance between the two. Ambient light (see *Discover Diving* - Sept/Oct. 1989) is a very narrow band underwater. It usually ranges from f 2.8 to f 5.6 at a 60th of a second, with ASA 100 film. It can reach f 8 in specific settings and rarely reaches f 11. The exception is a very clear swimming pool, outside, on a clear and sunny day, when it can reach f 16, but we are getting ahead of ourselves.

Underwater things generally move slowly, if at all in comparison to life on land, except for seals, whales and sharks. Thus, slow shutter speeds do not present a



major problem. This is good for trying to match ambient light, considering its narrow window.

If we want to take a picture of a diver relative to his surroundings we need to match ambient. If we meter the available light (see discussion on light meters at the end of this article) it will give us a starting point. Let us say that our meter tells us that ambient light is  $f\ 2.8$  at a 60th of a second (common reading in California waters when at depth) and we are using ASA 50 film. We decide that we want to use a higher  $f$  stop number to increase the depth of field and still match ambient. What can we do?

The simplest choice is to set the shutter speed to a 30th of a second. This slows the shutter and allows in twice as much light. We can then change the  $f$  stop to 4 which allows in one half the light of  $f\ 2.8$ . By this method we have achieved the same balance that  $f\ 2.8$  at a 60th provided, but gained depth of field. If we knew what conditions were before entering the water we could change our film to ASA 100, or twice as fast as the ASA 50 film. We could then take the same shot at a 60th at  $f\ 4$ , or a 30th at  $f\ 5.6$ . In the first example we could

not go to a 90th of a second and balance for ambient. Even at  $f\ 2.8$  we would be one half stop underexposed. It is for these reasons that the Nikonos IV is not a popular camera. It syncs only at a 90th.

If you overexpose the shot by shooting at a shutter speed, film speed and  $f$  stop that allows for more light than you metered, the ambient background becomes washed out, even if your strobe lighting was perfect. If you underexpose by not allowing in enough light your background will start to disappear and go to black.

The last example is used if you want to take a portrait photograph and expose only for the subject to be lit with your strobes. This technique is often used for product shots and when ambient is very low due to depth, no overhead sun, dirty water, or all of these factors. Using our example of ASA 50 film metered at  $f\ 2.8$  at a 60th you would shoot at  $f\ 4$ , or  $f\ 5.6$ . At a 30th expose at  $f\ 5.6$  or  $f\ 8$ . With ASA 100 film a 60th is  $f\ 5.6$  or 8 and a 30th is  $f\ 8$  or  $f\ 11$ .

### Close Range Shots

The second application is close range shots of objects where background ambi-

ent water will not show. An example would be a fish against a wall. In these shots you need to know the output rating of your strobe to avoid over or under exposing the shot. For example: The MCD 1 strobe is rated at  $f\ 5.6$  at 5 feet, with ASA 100 film at a 60th of a second. Thus at 5 feet the shot would be a 60th at  $f\ 5.6$ , or a 30th at  $f\ 8$ . Each foot closer would require closing down one stop and each foot away would require opening one stop. At 3 feet the shot would be  $f\ 11$  at a 60th and  $f\ 16$  at a 30th. At 7 feet the shot would be  $f\ 2.8$  at a 60th and  $f\ 4$  at a 30th. Before we proceed I want to add three additional bits of information.

The color of light (actual colors that appear in your photographs) can only be brought out by strobes in a short distance. At 5 feet the color of light falls off very quickly and is gone by 10 feet no matter how powerful the strobe. Using diffusers will lower the output of a strobe, but will often give warmer, more even lighting, and richer colors. You should also know that you are not limited to exact  $f$  stop number changes. The lens can be changed to  $1/4$  and  $1/2$  stop changes for subtle lighting differentials.

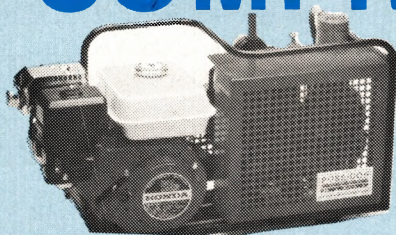
It is important to know the light output rating for your strobes as measured in BCPS (British Candle Power Seconds). This is a measurement of light output and tells the true efficiency of the strobe. The measurement of watt seconds that many refer to tells you little about the efficiency of the unit. Watt seconds is only a measurement in mathematical terms of energy from the capacitor, not necessarily what actually comes out the working end of the strobe, the flash tube.

All strobes come with a guide rating for film speed, shutter speed and  $f$  stops. These ratings are for strobe light to subject distance and do not allow for matching ambient light. If you want to match ambient light you must do it with the combinations we've discussed. No strobe is more powerful than the sun, so the strobe can not match ambient for you.

### Macro Shots

The third application is in macro photography and is the easiest of all. The

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proper settings for the Nikonos camera are a 60th of a second at f 22, with focus set at infinity. The film speed only tells you how close or far from the subject the strobe(s) need to be. The lower the ASA the closer your light source needs to be from the subject, and a higher ASA requires moving the light source away. It will take some practice to determine these distances, but if you take good notes during the first few rolls of film you expose, it won't take long.

Many books in the past have referred to setting the focus to "close focus" for macro. This is incorrect. All lenses, underwater or land, are designed to achieve their peak performance at infinity. By going to close focus you spread the lens elements as wide and as far apart as they will go. This causes distortions called aberrations and reduces the image sharpness and clarity, plus you will not achieve true color saturation, which is especially noticeable with reds.

### Lenses

This is a good time to discuss which is the best lens for your Nikonos camera when shooting macro and the answer is easy, the 28mm lens. This lens is designed only for water contact, thus in water is at its peak performance. It gives the best image clarity, sharpness and depth of field. Plus, it is a dynamite lens for medium range photography and fish shots.

The 35mm lens is also a good lens, but it is a lens that is designed to perform at its peak in air. There is some loss in image sharpness, clarity, depth of field and color saturation when used in the water. To the trained eye it is noticeable, especially when the image is enlarged. If you need a lens for both land and water then the 35mm lens is capable, while the 28mm lens does not work in air.

Two final points need to be made. The first is the element of depth of field underwater, or focus. Depth of field in a photograph on land is very noticeable and playing with it can dramatically effect the mood of the photograph. Underwater it is different. Depth of field is only noticeable out to about 30 feet under ideal conditions due to the density of water. From that point on it

is assumed by the eye, via the use of shadows and silhouette in your photograph composition. As conditions become less ideal, the focus out at the depth of field is less noticeable. In short, depth of field in the background of an underwater medium and wide angle photograph is often an illusion created by the use of shadows and silhouette.

Thus, matching ambient light becomes critical to the success of medium and wide angle shots if there is to be a background. Lack of matched ambient reduces the feeling for depth and dimensional qualities of the image. The eye will accept out of focus background and assume depth of field by the shadows presented. The eye will not accept out of focus foreground, so selection of f stops becomes important in that they match focal distance to the primary subject to be lighted. The ideal photograph has matched ambient with color provided by the strobes, without the strobes being evident in the image.

### Light Meters

The last point has to do with light meters. It matters not if the meter is in your Nikonos camera or if it is an external light meter. You must first test the meter to determine its actual reading capabilities. Meters can vary by as much as 1 to 2 stops, with most being 1/2 to 1/3 over, or under, actual ambient light.

Most underwater light meters, including those found in the Nikonos V camera, are electrical reflective meters. The Sekonic light meter is also a reflective meter, but operates mechanically through the use of gimbal and spring tension. It can be off up to one stop in low light levels.

Reflective meters measure the light reflected off surfaces, while incident light meters measure surrounding light. As a result, reflective light meters try to balance the light reading based upon the photographic standard of 18% gray. When tested in a white bottom swimming pool (most pools) they tend to compensate by underexposing to 18% gray. Thus after use in a real diving situation, divers find their photographs coming back underexposed with the water being too dark. To prevent this

problem do the following:

Take your meter into a swimming pool and shoot some test shots without strobes. Meter the water for ambient light based upon film with an ASA of 100 at a 60th of a second. Use a standard photography gray card (you can buy one at any pro camera store) and fill the frame with it. The card does not need to be in focus. Take a series of shots in 1/2 f stop increments to two stops over and under your measured ambient reading. Be sure to record the order of your shots.

When you get your images back from the processor immediately transfer your notes to the slide mounts. You can then study them and find the shot closest to the actual 18% grey card. This tells you the true exposure index for your meter. You can then make the needed mental adjustments every time you read it when diving by adjusting your f stop, or by adjusting your ASA/ISO rating in the camera or on your light meter before diving. If you change the battery in the meter you should repeat this test for true results.

I hope the proceeding information will be of assistance in your underwater photography. The relationship between film, shutter speed and f stops is not really that difficult and in a very short time will become second nature. Keep shooting, take good notes and you will soon have exciting results.



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# Things My Instructor Never Told Me

## ...About Wet Suits

by Eric Hanauer



**A**s the days grow short and water temperatures drop rapidly, a diver's fancy turns to thoughts of warmth. Some respond by sitting in front of a friendly fireplace, watching videotape replays of last summer's Caribbean vacation. Others, determined to keep

up the count in their diving logs, ponder whether the old wet suit will carry them through another winter.

Nothing lasts forever, and that's especially true of today's wet suits. An active diver can wear out a suit in a year. For the casual diver, three years is about the limit.

At this point, I can hear the protests of some readers, claiming that their old faithful is five years old and still going strong. But let's be realistic. Is it still easy to put on and take off? Does it still keep you as warm as it once did?

Mark Kettenhofen thinks not. Mark has been manufacturing custom wet suits for 16 years, 14 of them as head of his own company, Kettenhofen Enterprises of Orange, California. An active game diver, Mark has forgotten more about wet suits than most of us will ever know, so when he expresses an opinion, I listen.

The new softer Neoprene used in most of today's suits is lighter and stretchier than the material it replaced. Compared to those of a few years ago, suits made from it are a pleasure to wear. But there is no gain without a price. According to Kettenhofen, the new material wears out faster and demands more maintenance than the old stuff.

Even with the best of care, repeated compression and expansion of the tiny gas bubbles in Neoprene causes the cell walls to break down. Consequently, old wet suits act more like sponges than gas-filled barriers to cold water. Repeated stretching while donning and doffing wears out the seams, and they will leak as well. In addition, whenever the suit is folded in a dive bag, the creases in the material will break down more cells. We haven't even mentioned repeated kneeling on rocks, or sitting on hard boat decks, or cuts and tears from normal use.



So how many dives can a suit go through before it's ready for the rag bag? Kettenhofen couldn't come up with a definite answer, because it depends upon a number of factors. For example, deep diving results in more compression, breaking down more cells. The suit feels spongier, holds water longer, and takes longer to dry. At what point do you give it up? It's just like an old car. Eventually the rattles, faded paint, power loss, and mounting repair bills convince you that it's trade-in time.

It's a hard, cruel world for wet suits. I asked Kettenhofen to suggest what we could do to help ours last longer. Following are his recommendations.

Wash the suit in soapy water after every use. Woolite or a similar mild detergent is best. Then rinse in fresh water. This will not only remove unpleasant smells, but also dissolves salt crystals. Always wash the suit by hand, in a tub or plastic trash barrel. Never use a washing machine. The material may become caught beneath the agitator, then stretch and tear. Several of Mark's repair jobs have been on suits damaged in this way.

Not everyone has the patience to wash the suit in detergent and rinse it after every use. For the lazy diver, a thorough rinsing in a tub or barrel is the next best thing. This

is far more effective than flushing it with a hose, which usually results in more water splashed on the diver than on the suit. But without detergent, the suit will eventually begin to smell bad. When that happens, break out the Woolite.

The old advice about hanging the suit inside out, on a wide hanger, in a dark, dry place is still valid.

With the new soft rubber, small rips are more likely to become big rips. Kettenhofen suggests inspecting the suit carefully after every use, and touching up to wounds with Neoprene cement. His recommended gluing procedure is a bit different from what I had been doing all these years.

To repair a rip, first let the suit dry completely. Use regular fresh Neoprene cement. If it's stringy, it has outlived its usefulness. Apply two light coats, letting each dry completely, for about 30 minutes. Then apply a third light coat, wait two to three minutes, and press the pieces together. A good glue job will hold without sewing to back it up.

For small cuts or divots, no trimming is needed. For jagged tears, trim the edges smooth and clean. If necessary, place a piece of scrap in the middle to fill any gap.

I asked Kettenhofen's opinion on the ideal wet suit configuration. For Southern

California waters, he prefers a 1/4 inch farmer john, with a hood attached to the jacket. An attached hood does a better job of keeping those icy fingers of frigid water off your spine than a cold-water hood, or one attached to a chicken vest.

Mark still maintains that an unlined suit is the warmest and most flexible. It is made from a different rubber that doesn't compress as much as the lined material. However, talcum powder or diluted hair conditioner (slime) is required to get it on. That makes it somewhat impractical for beach diving or working from a small boat. However, if most of your diving is on a charter boat with a shower, this may be the way to go.

Lycra skin suits worn underneath can be helpful when putting on tight-fitting wet suits. They provide no thermal protection, but don't cause any heat loss, either. Mark favors anything that will make wet suits easier to manage.

Last winter's water temperatures were exceptionally cold. If that happens again this year, and you lack insulating body fat, Kettenhofen recommends a 3/8 inch body on the jacket and on the farmer john. The sleeves and legs would still be 1/4 inch for flexibility. Remember, though, that this configuration will require more weight than the normal 1/4 inch suit.



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How about dry suits? Mark feels that wet suits offer two major advantages. First, they are easy to get into and out of compared to a dry suit. Second, nothing can happen to a wet suit that would ruin a day of diving.

## The Readers Take Over

Sometimes, the ratio of work to fun in diving becomes almost unacceptably high. Many of our readers have techniques or short cuts to make things easier. The purpose of this column is to share those ideas. Any hint or technique that is published will win the writer a complementary, one-year subscription to Discover Diving. Send your ideas to "Things", c/o Discover Diving, P.O. Box 83727, San Diego, California 92138. Our files are bulging with mail, so we will just step aside now and let the readers take over.

## Frozen Lightsticks

With lobster season well under way, many more divers are making night dives, and using chemical light sticks for added safety. These make it easier to be seen from a distance, both underwater and on the surface. The problem is that the light becomes exhausted after about 12 hours, and therefore is good for only one night of diving.

Fred Beall suggests an easy way to extend to life of chemlights for two or three more dives. First, wait to activate the chemical until just before entry into the water. As soon as possible after the dive, put it on ice. If you brought along a cooler for post-dive refreshments, place it in there. This stops or retards the chemical reaction. As soon as you return home, place the chemlight in the freezer. The next time

you go night diving, give it time to warm to room temperature. This will restart the reaction.

## Lens Cap Substitute

Have you lost the cap for your Nikonos 15mm lens? Or are the threads getting ragged, making it difficult to put on? That expensive piece of glass requires protection, but the factory cap is in short supply and usually back-ordered. Mike Curtis, a marine biologist from Huntington Beach, California, discovered a unique substitute. He went to plumbing supply store and bought a three inch rubber end cap for plumbing pipe. It makes a perfect press fit over the 15mm lens, and is easier to mount and remove than the original. It doesn't look like original equipment, but performs the job just as well as the real thing. It's also considerably cheaper.



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## Diving Trends

### Weight Belts for Svelte Divers

Just when we thought we were finished with weight belt controversies, Cacie Cheuvront from Fresno came up with an idea for a specific segment of the population: Slim women divers. When diving in tropical waters, Cacie needs about five pounds of weight, but doesn't like weight belts or lead in BC pockets. She bought a pair of 2 1/2 pound ankle weights, locked them together, and wears them around her waist. This arrangement fits beneath the BC, releases easily, and even color-coordinates with her dive skin.

### Hauling Gear the Easy Way

R. James Hudson of Tallahassee, Florida does a lot of beach diving, but hates hauling gear to the site, a perfectly natural reaction. His solution is to use a hand truck. According to James, two to four tanks and two to three gear bags fit easily on one hand truck. The wheels are large

enough to make it over rocks, roots and numerous other obstructions found around a dive site. James didn't mention sand, so if your beach dives require sand traverses, I would suggest trying before buying.

### Prescription Lenses

Divers who need glasses have a choice of wearing contacts, purchasing masks with lenses built in, or having lenses laminated to the faceplate. (We won't consider lens holders inside the mask, because this is an awkward arrangement and lenses usually fog.) If you have corrective lenses for myopia (nearsightedness), you have probably encountered a problem in dim light. The pupils dilate to the equivalent of f 1.4, restricting depth of field, and making it difficult if not impossible to read your gauges. For many divers this means bifocals are necessary. A couple of companies even sell a tiny magnifying lens that fits in a corner of your mask to serve as a modified bifocal.

Although he isn't a diver, Dr. Walter Chase, a professor at Southern California College of Optometry, suggests a better way. Dr. Chase pointed out that some contact lens wearers have near correction in one eye and far correction in the other. Somehow, the brain compensates and tunes in the picture from the eye being used. He warned that this doesn't work for everyone, but suggested I try it in my mask. I did. I put a corrective lens in the left side of a two-window mask, and plain glass in the right. Now I can see distant objects clearly and focus my camera, while still being able to read my gauges and camera settings, even in dim light. Occasionally I have to move the gauges to the right of center to see them clearly. But there were no headaches, no vertigo, and no lengthy period of adjustment. The only compromise is a little loss of depth perception.

As Dr. Chase cautioned, this doesn't work for everyone. See your optometrist first, then give it a try if he or she approves.

Remember to send in your ideas for this column. It could win you a free subscription to *Discover Diving*.

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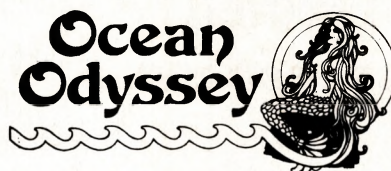


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Vacaville, CA 95688



News Briefs are a service provided to the diving community. If you have information you would like to share with other divers, this section is available to you at no charge. Releases should be concise and be limited to 150 words. Publication of the newsbrief is not necessarily an endorsement of the item by Discover Diving.

## NEW INSTRUCTOR TRAINING FACILITY

Now you can go through your ITC at the largest fresh water dive resort in the world. Bonne Terre Mine is the newest top notch SSI training facility.

West End Diving/Bonne Terre Mine offers one of the most comprehensive instructor training programs in the industry. The mine offers ideal training conditions to the student, with the best of all worlds of diving. It is a constant environment without the harsh conditions that most dive sites have. Come learn with West End Diving and SSI from the pros who dive with Cousteau.

For more information, contact Doug Georgens at West End Diving, 11215 Natural Bridge Road, Bridgeton, MO 63044 or phone (314) 731-5003.

## CHANNEL ISLANDS UPS PHOTO COMPETITION

The Underwater Photographic Society of Channel Islands is sponsoring its 4th annual California Underwater Photographic Competition. Entrants from around the world are invited to compete with prints and slides in six categories. All photographs must have been taken underwater in California waters. There is a black and white print category and a video category. The deadline for entries is January 15, 1990. Plaques will be awarded for first through third place in all categories along with many prizes.

For further information and complete competition rules, write to Terry Schuller, CIUPS, 508 Harbor Lights, Port Hueneme, CA 93041.

## SPORTOURS IN DIVING

SPORTOURS, a Southern California based division of Sport Chalet Travel Service has announced its new emphasis on diving related tours and expeditions.

Well known for its years of experience in the ski travel industry, SPORTOURS has established a powerful network with SPORT CHALET DIVERS, a retail diving and training facility with eight

locations in Southern California.

According to SPORTOURS' co-owner, Martha Perez, "In addition to coordinating several annual group trips for SPORT CHALET DIVERS, our major function is to assist the individual traveler or couple who would like a trip of their own, or are unable to meet group departure schedules."

Individual travel queries can be made by contacting SPORTOURS' Dive Specialist, Jim Hill at 16242 Beach Blvd., Huntington Beach, CA (714) 848-4696.

## NAUI ANNOUNCES RECALL OF CALCULATOR

The National Association of Underwater Instructors announces the immediate recall of the NAUI Dive Time Calculator, Product #137. Although the Dive Time Calculator has met with enthusiastic response from both professional instructors and student divers, several typographical errors have been discovered.

Although not life-threatening, these errors prompt an immediate recall and all persons in possession of this product are urged to suspend use and return their Dive Time Calculators to NAUI Headquarters for immediate replacement. Return to: NAUI HQ, Attn: RECALL, P. O. Box 14650, Montclair, CA 91763 USA

## PARTY ANIMALS UNITE! 1989 DIVER'S NEW YEAR'S EVE PARTY

Join many of our local and world renowned diving celebrities and all your friends at the social event of the year. Dinner, dancing, door prizes, fantastic raffle and good times are promised. Party will be held at the Town and Country Convention Center in San Diego from 7 p.m. until 2 a.m. Special room rates available for this event. Tickets are \$40.00 each before December 7th, \$50.00 each after. No tickets sold after December 26th. For more information, call (619) 462-3439 and leave a message or write to: Diver's New Year's Eve Party, P. O. Box 81678, San Diego, CA 92138-1678

## SAN JOSE'S ONLY PADI 5 STAR FACILITY! Featuring Continuing Diving Education/Advanced Classes Your Guide to Adventure

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- Instructors for Marine/World, U.S.A.

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### PACIFIC OFFSHORE DIVERS, INC.

1195 Branham Lane  
San Jose • (408) 265-DIVE (3483)  
(In Branham Oaks Plaza — Across from Orchard Supply)

Open 10-8, Mon-Fri; Sat 10-5





### **GALAPAGOS DIVE EXPEDITION**

Tropical Adventures, has announced two special 13-day dive expeditions to the Galapagos Islands: February 13-25, 1990 and May 29-June 10, 1990. A three-day

Indian market excursion is also included.

Bob and Lynn Goddess, owners of Tropical Adventures, will be leading these exciting dive expeditions which include 3 nights in Quito, 7 nights aboard the 70 ft. motorsailer CACHALOTE, all meals while on board, use of tanks, weights and belts,

airport and luggage transfers in Quito and Galapagos; all taxes, service charges and luggage handling throughout the trip. Upon return to Quito, three days will be spent exploring Cotopaxi National Park, and Ecuador's famous Indian markets of Calderon and Otavalo. The cost of the trip is \$1,995 per person, plus airfare.

The majority of the islands are uninhabited. Only 13 of the islands are larger than 9 square miles and only 5 of them are populated, making this an ideal destination for those interested in natural history, wildlife and ecology, as well as unusual and outstanding diving.

For more information on this or other special dive expeditions, contact Tropical Adventures, 170 Denny Way, Seattle, WA 98109 or call toll-free (800) 247-3483.

### **SSI ASSOCIATE MEMBERSHIP**

SSI's Associate Membership program provides resorts, professional charter boat operators and educational facilities with a profitable alternative to full membership.

The Associate Membership has three classifications: Resort, Educational, and Charter Boat.

Resorts worldwide have discovered the attraction of SSI's Resort Associate Membership the opportunity to become a SSI Referral Member. As a Referral Member, your resort can conduct open water training for entry level and advanced SSI students, and participate in the worldwide referral networking system.

SSI also offers an Associate Membership for professional Charter Boat Operators. This limited membership provides interaction between SSI Member Stores and Charter Boat Operators. The Charter Boat program allows your participation in the worldwide referral networking systems.

Becoming a part of SSI's Associate Membership not only assures you of a profitable business relationship, but also associates you with one of the fastest growing and successful dive certification agencies in the world. Call us today at (303) 482-0883 and find out how you can become a SSI Associate Member.



**PENGUIN  
SPORTWEAR  
IS  
COMING.**

A New Concept Of Dry Suit Underwear.

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## DRYSUIT DIVING WORKSHOP

On Saturday, December 2, the California State University, Ocean Studies Institute will sponsor an all day Drysuit Diving Workshop on the Cal State University, Long Beach campus.

The day will begin with in-depth coverage of safety considerations when using a drysuit, presented by well-known expert Steven M. Barsky. In addition, information will be provided on how to select the drysuit that best meets your needs, maintenance and repair, durability and reliability of various kinds of suits, and overall techniques for diving with a drysuit.

Several manufacturers will be present to provide detailed information about their particular suits, including in-water demonstrations, and opportunities for all participants to "get wet" and try them out for themselves! Manufacturers scheduled to participate include Dacor, DUI and Viking.

Workshop fee of \$45 will include a copy of The Drysuit Diving Manual (\$8.95 value), refreshments, and lunch.

For more information, contact Diving Safety Workshop, CSULB Ocean Studies Institute, Long Beach, CA 90840-3702 or call (213) 985-7588.

## Scubapro Windjammer Jacket

Handsome, versatile, functional, this jacket displays a two-tone gray and black outershell of Burlington "VersaTech" fabric for maximum water repellance. It has a ventilated mesh lining allowing for excellent breathability. Additional features include zip-thru convertible collar and two outer pockets with storm welts. Available in small through extra-large at your local Scubapro Retailer.

## Dive Travel Bookings

Landfall Productions, a stateside representative for selected resorts and liveaboards throughout the Caribbean and South Pacific provides specialized dive travel services for individuals, groups and dive

stores. Staff personally visits each destination to compile complete and accurate information on the diving, accommodations, food, and topside activities available for non-divers. Choosing the destination that is right for you is easy; Request Landfall's Fact Packets, "WHAT YOU SHOULD KNOW BEFORE YOU GO."

In addition, Landfall's photographic team provides dive store and group bookings with a complete travelogue presentation in 35mm slide format for trip promotions.

Experience the LANDFALL difference by calling toll free (800) 525-3833. In California, (415) 651-6499.

## NEW MARK II BATTERY

Orca Industries, the diving computer company, has just introduced a new battery for the Orca Mark II Computer. The new battery, called a "CR" series battery, provides over 1,000 hours of operating time for the Mark II. This is double the life of the previous "ER" series battery. The "CR" battery is presently available at Orca Dealers and now comes standard in all Mark II Computers. The new battery will increase operating time between battery changes and decrease operating costs. For

more information, please contact your local Orca Dealer or Orca Industries, Inc., at 10 Airport Way, Toughkenamon, PA 19374. Tel. (215) 268-3164

## UK 1200 HALOGEN



Underwater Kinetics is proud to announce the "UK 1200 HALOGEN", the latest in our powerful UK Series dive lights.

The "UK 1200 HALOGEN" incorporates the most recent developments in

*Continued on page 93*

## New Boat! HORIZON SAN DIEGO

78' Custom for Diving



*Charters from the Channel Islands to the Sea of Cortez*

- Ten minutes from San Diego Airport
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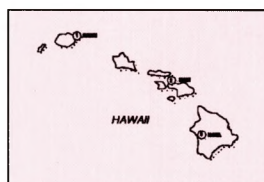


# Dive Store Directory



Patronize one of these fine  
diving facilities and pick up  
your next issue of  
***Discover Diving***

## HAWAII



## ARIZONA

**Arizona Scuba Center**  
5027 N. 7th Ave.  
Phoenix, AZ 85013  
(602) 265-8118  
**Desert Divers, Inc.**  
4521 W. Indian Blvd.  
Phoenix, AZ 85031  
(602) 269-2141

### Aqua Fun

5735 E. Speedway  
Tucson, AZ 85712  
(602) 886-3535

### Desert Divers

3550 N. 1st, #260  
Tucson, AZ 85719  
(602) 887-2822

### Scuba Cove

3575 E. Speedway  
Tucson, AZ 85716  
(602) 795-1440

## CALIFORNIA

### Mother Lode

2020 H Street  
Sacramento, CA 95814  
(916) 446-4041

### The Original Steele's

1334 Howe Street  
Sacramento, CA 95825  
(916) 923-5500

### Scuba Sports

Citrus Heights, CA  
(916) 726-3483

### Ocean Odyssey

130 G Street  
Davis, CA 95616  
(916) 758-3483

### Nautilus Diving and Sport Center

5250 Pacific Street  
Rocklin, CA 95677  
(916) 624-3483

### Sports Cove

1410 E. Monte Vista  
Vacaville, CA 95688  
(707) 448-9454

### Scubaventures

2222 Cliff Drive  
Santa Cruz, CA  
(408) 476-5201

### Stockton Aquatic Center

1127 W. Fremont St.  
Stockton, CA 95203  
(209) 467-3483

### Aquarius Dive Shop

2240 Del Monte Avenue  
Monterey, CA 93940  
(408) 375-1933

### Aquarius Dive Shop

32 Cannery Row, Unit 4  
Monterey, CA 93940  
(408) 375-6605

### The Dive Shop

of Santa Maria  
1975-B S. Broadway  
Santa Maria, CA 93454  
(805) 922-0076

### Aquatics of Santa Barbara

5370 Hollister  
Santa Barbara, CA 93111  
(805) 964-8689

### Divers Den

22 Anacapa Street  
Santa Barbara, CA 93101  
(805) 963-8917

### Scuba Luv

704 E. Thousand Oaks  
Thousand Oaks, CA 91360  
(805) 496-1014

### Sport Chalet

24200 W. Lyons Avenue  
Valencia, CA 91321  
(805) 253-3883



### **Diver's Edge**

18724 Soledad Canyon  
Canyon Country, CA 91351  
(805) 251-3483  
**Sea to Sea Scuba School**  
965 So. Mt. Vernon  
Colton, CA 92324  
(714) 825-2502

## **San Francisco Bay Area**

### **The Original Steele's**

1390 N. McDowell  
Petaluma, CA  
(707) 664-8426

### **The Original Steele's**

2689-C Mounument  
Concord, CA 94520  
(415) 682-5082

### **Scuba Discoveries**

651 Howard Street  
San Francisco, CA 94105  
(415) 394-6555

### **Cal School of Diving**

1595 University Av.  
Berkeley, CA 94702  
(415) 644-2373

### **The Original Steele's**

5987 Telegraph  
Oakland, CA 94609  
(415) 655-4344

### **Tri-Valley Scuba**

21310 San Ramon Villy.  
San Ramon, CA 94583  
(415) 828-5040

### **Undersea Adventures**

2830 Crow Canyon  
San Ramon, CA 94583  
(415) 838-2348

### **The Original Steele's**

147 S. Main  
Milpitas, CA  
(408) 298-4224

### **Wet Pleasure**

2350 El Camino Real  
Santa Clara, CA 95051  
(408) 984-5819

### **Any Water Sport**

1130 Saratoga  
San Jose, CA 95129  
(408) 244-4433

### **Outrigger Dive Center**

2110 Winchester  
Campbell, CA 95008  
(408) 374-8411

### **Pacific Offshore Divers**

1195 Branham  
San Jose, CA 95118  
(408) 265-3483

### **Stan's Skin Diving**

354 S. Bascom  
San Jose, CA 95128  
(408) 998-0767

### **Harbor Dive Center**

200 Harbor Drive  
Sausalito, CA 94965  
(415) 331-0904

### **Clearwater Oceansports**

1275 Hwy. 1  
Bodega Bay, CA 94923  
(707) 875-3054

## **Los Angeles County**

### **Scuba Duba Dive**

7126 Reseda  
Reseda, CA 91335  
(818) 881-4545

### **Scuba Luv Aquatics**

22725 Ventura  
Woodland Hills, CA 91364  
(818) 346-4799

### **Pacific Scubaut**

6959 Van Nuys Boulevard  
Van Nuys, CA 91405  
(818) 787-7066

### **West Coast Divers Supply**

16931 Sherman Way  
Van Nuys, CA 91406  
(818) 708-8137

### **Reef Seekers**

8642 Wilshire  
Beverly Hills, CA 90211  
(213) 652-4990

### **Blue Cheer**

1731 Wilshire Boulevard  
Santa Monica, CA 90403  
(213) 828-1217

### **Marina Del Rey Divers**

2539 Lincoln  
Marina Del Rey, CA 90291  
(213) 827-1131

### **Sport Chalet**

920 Foothill  
La Canada, CA 91011  
(818) 790-9800

### **Southern California Diving**

1121 Glendora  
West Covina, CA 91790  
(818) 338-8863

### **Guccione's Scuba Habitat**

3220-B Brea  
Diamond Bar, CA 91765  
(714) 594-7927

### **Divers Corner**

12045 Paramount  
Downey, 90241  
(213) 869-7702

### **Marina Dive and Sport**

291 W. 22nd  
San Pedro, CA 90731  
(213) 831-5647

### **Pacific Wilderness & Ocean Sports**

1719 So. Pacific Ave.  
San Pedro, CA 90731  
(213) 833-2422

### **Catalina Divers Supply**

Green Pleasure Pier  
Avalon, CA 90704  
(213) 510-0330

## **Orange County**

### **Openwater Habitat**

411 S. Main  
Orange, 92669  
(714) 744-8355

### **Sport Chalet**

16242 Beach  
Huntington Bch. CA 92647  
(714) 848-0988

### **Pacific Camera**

730 W. 19th  
Costa Mesa, CA 92627  
(714) 642-7800

### **Aquatic Center**

4535 W. Coast Hwy.  
Newport Beach, CA 92663  
(714) 650-5440

### **Mr. Scuba**

13544 Newport  
Tustin, CA 92680  
(714) 838-6483

### **Black Bart's**

24882 Muirlands  
El Toro, CA 92630  
(714) 855-2323

### **Sport Chalet**

27551 Puerta Real  
Mission Viejo, CA 92647  
(714) 582-3363

### **Mr. Scuba**

1031 S. Coast Hwy.  
Laguna Beach, CA 92651  
(714) 494-4146

### **Adventures in Diving Supply**

31678 Coast Hwy.  
South Laguna, CA 92677  
(714) 499-4517

### **Black Bart's**

34145 W. Coast Hwy.  
Dana Point, CA 92629  
(714) 946-5891

### **Steve's Ski & Sport**

406 N. Main St.  
Corona, CA 91720  
(714) 735-4240

## **San Diego County**

### **Pacific Coast Divers**

3809 Plaza, #108  
Oceanside, CA 92056  
(619) 726-7060

### **Diving Locker**

405 N. Hwy. 101  
Solana Beach, CA 92075  
(619) 755-6822

### **Ocean Enterprises**

191 N. El Camino Real  
Encinitas, CA 92024  
(619) 942-3661

### **Del Mar Ocean Sports**

1227 Camino Del Mar  
Del Mar, CA 92024  
(619) 792-1903

### **Diving Locker**

348 E. Grand  
Escondido, CA 92025  
(619) 746-8980

### **Sport Chalet**

Vineyard Shopping Center  
Escondido, CA  
(619) 746-5958

### **Sport Chalet**

5500 Grossmont Center  
La Mesa, CA 92041  
(619) 463-9381

### **Diving Locker**

8650 Miramar, #C  
San Diego, CA 92126  
(619) 271-5231

### **Diving Locker**

1020 Grand  
San Diego, CA 92109  
(619) 272-1120

### **Ocean Enterprises**

7710 Balboa Ave.  
San Diego, CA 92111  
(619) 565-6054

### **Sport Chalet**

4313 La Jolla Village Dr.  
#K-001  
San Diego, CA 92110  
(619) 552-0712

### **South Bay Divers**

565 Satum Blvd., Ste. J  
San Diego, CA 92154  
(619) 423-5880

### **Sea ME Repair**

4352 Poplar Street  
San Diego, CA 92105  
(619) 563-9033

### **Sport Chalet**

3695 Midway Drive  
San Diego, CA 92102  
(619) 224-6777

### **Wet Education Training**

7094 Miramar  
San Diego, CA 92121  
(619) 693-3483

### **Buhrow Into Dive & Surf**

1536 Sweetwater Rd. Ste. B  
National City, CA 92050  
(619) 477-5946

## **COLORADO**

### **Mile High Divers**

3278 S. Wadsworth Bl  
Lakewood, CO 80227  
(303) 987-2822

## **HAWAII**

### **Aquatics Kauai**

733 Kuhio Highway  
Kapaa, HI 96746  
(808) 822-9213

### **Dive Maui**

Lahainaluna Rd. & Front Street  
Lahaina, HI 96761  
(808) 667-2080

### **Lahaina Divers**

710 Front Street  
Lahaina, HI 96761  
(808) 661-4505

### **The Dive Shop of Kihei**

1975 So. Kihei Road  
Kihei, HI 96753  
(808) 879-5172

### **Jack's Diving Locker**

Kona Inn Shopping Center  
Kailua-Kona, HI 96740  
(808) 329-7585

### **Kona Scuba Seafaris**

P.O. Box 2302  
Kailua-Kona, HI 96745  
800-657-7704

### **Kona Coast Divers**

75-5614 Palani Road  
Kailua-Kona, HI 96740  
(800) KOA-DIVE

## **OREGON**

### **Aquatic Sports & Scuba**

10803 SW Barbur  
Portland, OR 97219  
(503) 245-4991

### **Eugene Skin Diving**

1090 West 6th  
Eugene, OR 97402  
(503) 342-2531

### **Seasports Scuba Center**

1147 Main St.  
Springfield, OR 97477  
(503) 726-2055

### **Aqua Toys**

1515 S. 6th Street  
Klamath Falls, OR 97601  
(503) 883-3483

## **NEVADA**

### **Blue Seas**

3993 Spring Mountain Road  
Las Vegas, NV 89102  
(702) 367-2822

### **Diver's Locker**

3416 E. Lake Mead, #7  
Las Vegas, NV 89030  
(702) 642-3311

### **Dive West, Inc.**

5831 E. Lake Mead Bl.  
Las Vegas, NV 89115  
(702) 459-3483

### **Dive West II**

2580 Duneville  
Las Vegas, NV 89102  
(702) 459-5253

### **Southern Nevada Dive Center**

848-A E. Lake Mead  
Henderson, NV 89015  
(702) 564-3483

## **UTAH**

### **Scuba City**

680 W. 200 N. #31  
Logan, UT 84321  
(801) 752-3483

## **TEXAS**

### **Sea Sports Scuba**

10971 Northwest Frwy.  
Houston, TX 77092  
(713) 688-7777

## **WASHINGTON**

### **Silent World**

13600 NE 20th Street  
Bellevue, WA 98005  
(206) 747-8842

### **Emerald Seas Diving**

P.O. Box 269  
Deer Harbor, WA 98243  
(206) 946-2185

### **American Sport Diver**

12630 120th Ave NE  
Kirkland, WA 98034  
(206) 821-7200

### **Lighthouse Diving Center, Inc.**

5421 196th St. SW  
Lynnwood, WA 98036  
(800) 777-3483

### **Whidbey Island Dive Ctr**

8636 80th NW  
Oak Harbor, WA 98277  
(206) 675-1112

### **Underwater Sports**

10545 Aurora Ave  
Seattle, WA 98133  
(206) 362-3310

### **Anacortes Diving & Supply**

2502 Commercial Ave.  
Anacortes, WA 98221  
(206) 293-2070

### **Tacoma Watersports**

Suite C  
10310 S. Tacoma Way  
Tacoma, WA 94899  
(206) 581-5691

## **CANADA**

### **Clavella Adventures**

P.O. Box 866-A Nanaimo  
B.C., Canada V9R 5N1  
(604) 753-3751

### **Seafun Divers Ltd.**

300 Terminal Ave.  
Nanaimo B.C., Canada  
V9R 5C6  
(604) 754-4813

### **Seafun Divers Ltd.**

1761 Island Hwy.  
Campbell River B.C.,  
Canada V9R 5C6  
(604) 287-3622



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# Classifieds

## Audio / Video

**Nikon N2000** camera body. Little use. \$200. Contact Al (619) 276-6449

**Aqua Video Housing** for full size VHS camcorder, includes video lights (Oceanic), carrying case, plus acc. Camera also available to make complete package Call Bob (619) 259-3175

Advertise your audio or video products here for \$5 per line or \$20 for 5 lines!

## Compressors

**Davey Eagle 5000 psi**, 28 CFM, gas compressor on tandem axle trailer. Set-up to deliver high volumes of air. Serious inquires only. Mitchell (805) 484-1013

**Ingersol Rand 4R15** gas compressor and 4.2 SCFM gas compressor. One or both - very reasonable. Mitchell (805) 484-1013

## Dive Trips

**Cozumel - Hotel Club Del Sol** - 26 a/c rooms. We are the closest hotel to the main diving reefs. Our beautiful, coral garden beach, lies just a few steps from pool bar and ocean view restaurant. Relaxed, laid-back atmosphere, without a phone. Close to action, but away from the hustle and bustle. Great diving packages. Call for information. 800-228-6112 Texas (713) 475-0890.

## Dive Trips

**M.V. "Isla Mia" The Dive Fantasy** Book Directly with the Manager Owners. Call 504-45-1478 Roatan, Bay Islands, Honduras. Most experienced live-aboard with complete facilities Undercurrents 41/2\* Rating. Write to P.O. Box 27905, Houston, TX 77227-7905

**Dive Kenya With Discover Diving** Join the staff of Discover Diving in Kenya, fall 1990. Call for details (619) 697-0703

**Dive Santa Cruz, Monterey** Aboard the Delphi, Santa Cruz's newest 6 pack dive boat - Call (408) 476-5201

**Cozumel with Black Barts** La Ceiba Beach Hotel. Dec. 3rd, \$850. Dbl Occ. 8 days/7 nights. 5 days of diving, 2 tanks daily with lunch. R.T. Air Fare. Call (714) 855-2323.

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**video - Dr. Chris Dueker**, author of *Scuba Diving in Safety & Health*, lecture on current trends in decompression sickness. Call for brochure and order form. Joyce (415) 322-6984 afternoons.

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**Experienced Editor/Writer** In N. California to help launch new diving newsletter. Knowledge of Pubs business useful. Will consider enthusiasm and talent in lieu of some experience. Call Michael (408) 464-0730.

**Wanted used Nikonos** cameras and lenses, especially 15mm lens. Will pay cash (619) 697-0703

## Place your classifieds Today! Here's how:

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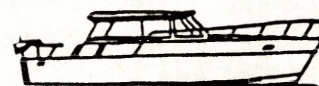
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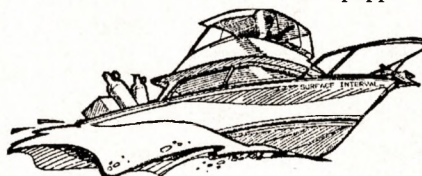
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## Dive the Surface Interval

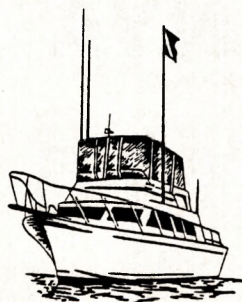
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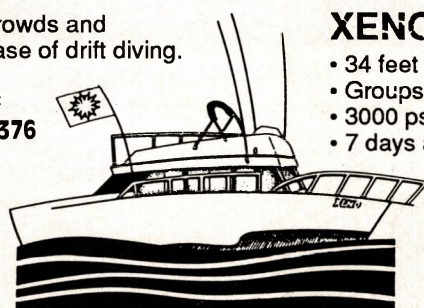
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To separate the "UK 1200 HALO-GEN" from the field, Underwater Kinetics is introducing it in a positively eye-opening fluorescent green.

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For more information, contact our dive light specialists: Tony Demaria, Jeff Allsop at (800) 852-7483.

## AQUACOM SSB-2000



Ocean Technology Systems proudly introduces Aquacom SSB-2000, a single sideband, underwater telephone. This powerful, self contained diver worn transceiver will transmit diver to diver up to 1/2 nautical mile! SSB 2000 is a "push-to-talk" or voice activated (VOX) system which also offers an adjustable squelch which helps eliminate marine biological noise. With the addition our optional CDK-3 Surface Accessory Kit, the SSB 2000 is easily converted to a portable surface unit.

The Aquacom SSB-2000 system was designed for the search & recovery teams as well as commercial divers. A sport diver model, the SSB 3000, is also available.

For further information regarding the Aquacom SSB-2000 or our many other underwater communication systems contact your local Ocean Technology Systems dealer, or call direct at (714) 966-1639.

## HARVEY'S CHILDREN'S FUN SERIES



Harvey's has been manufacturing children's suits since 1957 and prides itself on a complete line to choose from. The quality of the Children's Fun Series is what you would expect of a company which focuses its energy on neoprene water sports apparel.

The photograph shows two examples: On the left is Harvey's surface sport suit, the Easy Rider, in 1/8" SOFTSTRETCH (TM). Model SSNT 461. On the right, is a two tone Pacific Sport Diver suit in SOFTSTRETCH (TM). Available in 3/16" Nylon two sides SSNT 102 & 1/4" Nylon two sides SSNT 103.

The Easy Rider model SSNT 461 is available in toddler to child large sizes. The rest of Harvey's line is available in child small, medium and large.

You can see the Children's Fun Series at your nearest authorized Harvey's dealer. For more information, send \$2.00 for Harvey's 24 page, full color 1989 catalog. Write: Harvey's Skin Diving 2505 S. 252nd Street, Kent, WA 98032-USA.

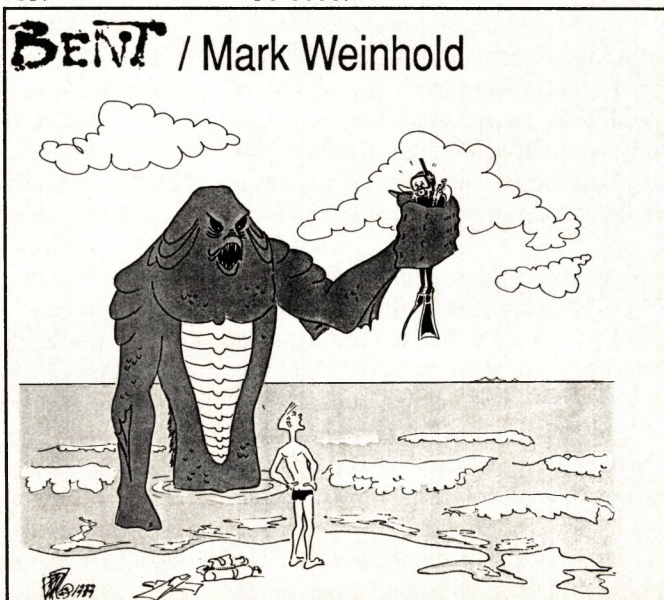
## OCEANIC USA PURCHASES NEPTUNE

In April of this year, the outstanding common stock of Neptune USA, a wetsuit manufacturer to the sport diving industry, was purchased by Oceanic USA. Neptune USA is now a wholly owned subsidiary of Oceanic.

The purchase of Neptune USA allows Oceanic to implement some very important changes to the operations and marketing of the wetsuit line. Beginning August 1, 1989, the name Neptune USA will be dropped and all wetsuits will be marketed under the brand name Oceanic.

"The wetsuit line will become even more important to Oceanic now that this reorganization has taken place. We're making it easier for our dealers to do wetsuit business with Oceanic and we're removing the confusion that may have existed regarding the Oceanic/Neptune wetsuits. Wetsuits will be a much stronger line for us in the future and we are continuing to look into new materials, and manufacturing processes. We are also funneling more resources into our marketing programs.", said Bob Hollis, President of Oceanic.

Oceanic Dealers may now place orders for Oceanic wetsuits by calling (800) 458-8800.



Put it back Fred! I told you, this is a RESERVE. YOU CAN'T TAKE ANYTHING!



# Horror Stories or Another Near Miss

by Dick Anderson

In the early fifties, diving instruction was really simple. The whole thing was generally taken care of with one sentence: "Just breathe normally, and don't hold your breath when you come up." If a guy made it back to the boat, he was a diver; if he didn't, he made the newspapers. E. R. Cross was still typing away at his pioneering work UNDERWATER SAFETY, and aqualung diving was casually regarded as a safe way to dive without knowing anything.

In those days, the magic depth that made a guy a bonafide diver was 300 feet. I did it, and a lot of other guys did it; but thankfully, it was a short lived fad. Anyway, deep dives were taken rather casually because no one was generally aware of the broad range of negative ramifications.

Well sir, there was this Japanese Fleet Type submarine sunk off Palos Verdes and I was trying to find it. The one diver who had supposedly been on the sub after it sank supplied me with his chart.

My buddy, Jack Reynolds, joined in the hunt. The sub was over 200 feet deep and we dragged for it with a big grappling hook.

One bright, sunny morning our grapple hung up on a solid target at 205

feet and Jack and I geared up to go down for a look. The water at Palos Verdes varied from dirty to clear and this day it was clear. Somehow, clear water adds to the casualness with which one regards a deep dive. As we suited up, Jack and I made a bet to see who could get to the bottom first. Jack was using the old standard Aqualung, and I was using a little single-hose regulator I made in his machine shop. The second stage was fashioned from a beer can with a diaphragm for a diaphragm. We hit the drink and the race was on. In those days, my eustachian tubes were like open conduits and I didn't see Jack after the initial splash.

I remember passing the 100 foot marker. The next thing I remember was slowly regaining consciousness, twitching, with a very strong taste of ether in my mouth. I was lying on my back on the muddy bottom at 205 feet. Thanks to a crude mouthpiece strap, and the low buoyancy of my mouthpiece, the second stage was still in my mouth. As I regained my senses, I could see Jack descending about 50 feet above me. At the time, I thought I had a clear head, but I wasn't aware enough to even be alarmed by what had just happened.

Jack joined me on the bottom and we

checked out the grapple. It was solidly hooked on a ridge of firm clay with no submarine in sight. We made our ascent in accordance to the old Navy tables. Just another adventure.

Observations: I'm not sure why I passed out. I can speculate that it was because my descent was so rapid I didn't get an adequate exchange of gas in my lungs.

The strong taste of ether was a childhood association with the unpleasant sensation of losing consciousness with anesthesia. Observance of that sensation has saved my life on at least two deep solo dives since then.

The thing that saved my skin on this dive was the little regulator I was using. It was extremely sensitive and remained in place. Jack and I figured that, in view of his slow descent, I must have been out for over one minute. If I had been using the Aqualung, with its buoyant double hose and overpressure in the face-up position, I would probably have drowned. And Jack would have gotten all the lunch.

Moral: Don't make a 200 foot dive in 30 seconds.

p.s.: The sub is still there - if it ever was there.



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And naturally, Liberators come in a variety of hot Tabata colors.

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Put on a pair of Liberators before your next dive. You'll be making a very fashionable splash.

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